

Currency Derivative



Yohanes Jimmy



Agenda

- ◉ **Currency Futures**
- ◉ **Currency Options**
- ◉ **Complex Option**





Part-I

Currency Futures



Currency Futures

- Futures = standardized forward that are traded in organized exchange market
 - Contract size:
Exp: 1 lot of EC = € 125,000; 1 lot of BP = £ 62,500
 - Delivery date:
Fixed, usually in the 3rd week of Mar, Jun, Sep, Dec
 - Futures exchange rate:
Based on market mechanism
Exp: future rate of EUR/USD = 1.3000
Value of 1 lot of EC = € 125,000 x 1.3 = 162,500
- Futures transactions use margin trading mechanism.

Margin Trading



- ◉ In margin trading, investors have to place an amount of money as collateral.
- ◉ Some definition:
 - **Margin account:** to place some amount of money as collateral to make transactions
 - **Initial margin:** amount placed in margin account before transaction
 - **Maintenance margin:** minimum amount can be allowed for next transactions
 - **Margin call:** order to place addition amount if margin balance below maintenance margin.

Basic Rules



- ◉ **Quotation:**
 - All payment in USD → American term quotation
- ◉ **Trading partner:**
 - We have to be a member of future exchange
 - We trade with Clearing House
 - We may act as buyer or seller
- ◉ **Daily settlement:**
 - Future rate is marked to market
 - Gain and loss are adjusted to margin account
 - Maintenance margin will be monitored daily

Example: Future Contract



Contract Items	AUD	GBP	EUR	CHF
Symbol	AD	BP	EC	SF
Contract size	A\$100,000	£62,500	€125,000	CHF125,000
Initial Margin	\$ 2,025	\$ 1,890	\$ 3,240	\$ 2,700
Maintenance	\$ 1,500	\$ 1,400	\$ 2,400	\$ 2,000
Min price change	\$ 0.0001	\$ 0.0002	\$ 0.0001	\$ 0.0001
Value of 1 pips	\$ 10.00	\$ 6.25	\$ 12.50	\$ 12.50
Months traded	March, June, September, December			
Trading hour	07.00 am – 02.00 pm (central time)			
Last day of trading	The 2 nd business day preceding the 3 rd Wednesday of delivery month			

Source: Chicago Mercantile Exchange (July 1st, 2008)

Futures Contract

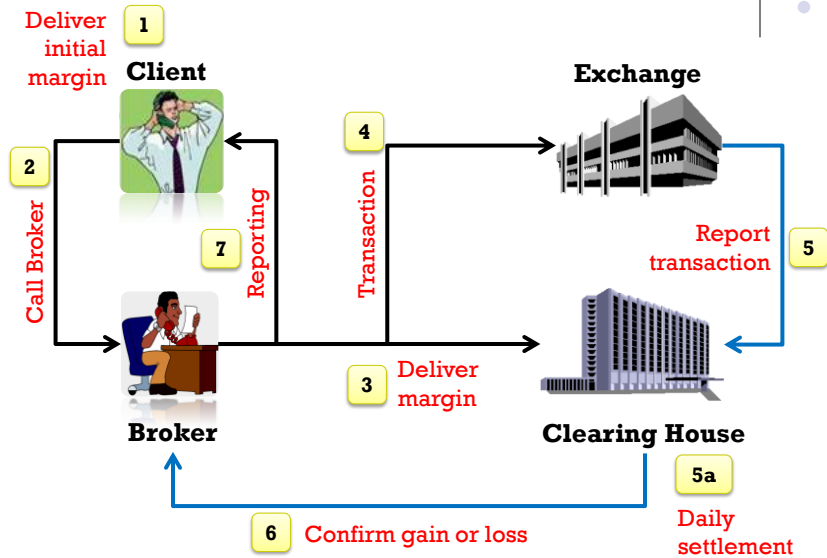


We want to buy 1 lot
of EC:

- Contract size:
€ 125,000
- Initial margin:
\$ 3.240
- Maintenance margin:
\$ 2.400

- Today : November 19, 2012
- Position : Buyer
- Product : EC 001
- Size : € 125,000
- Number of lot : 1 (one)
- Price : 1,3000
- Value : \$ 162,500
- Delivery date : December 19, 2012
- Last trading : December 17, 2012
- Initial margin : \$ 3,240
- Maintenance : \$ 2,400

Futures Transaction



Buy and Sell Futures Contract

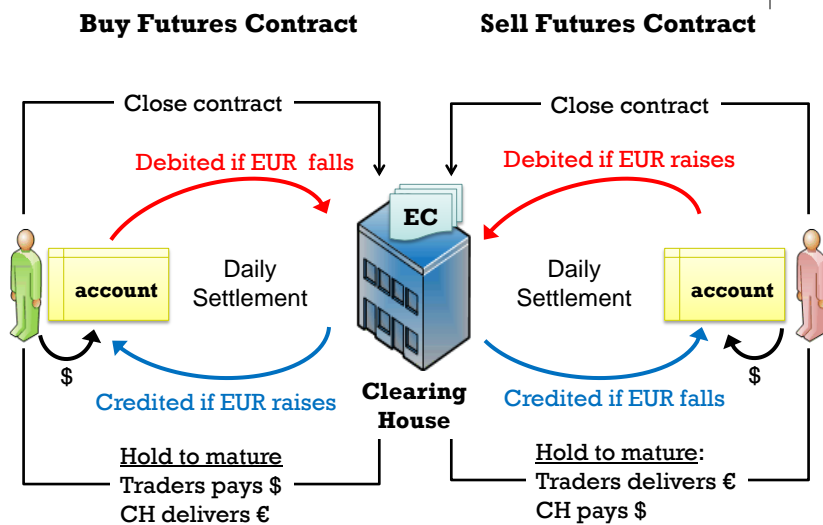


Illustration: Daily Settlement (EC Futures = € 125,000)



Day	Activity	Future Price	Closing Price	Gain/Loss	Margin Balance
	Initial Margin				\$ 3,240
Monday	Buy EC Futures	1.3000	1.3020	\$250	\$ 3,490
Tuesday	----	1.3020	1.2900	(\$1,500)	\$ 1,990
	Margin call			\$1,250	\$ 3,240
Wednesday	---	1.2900	1.2870	(\$375)	\$ 2,865
Thursday	Close contract	1.2870	1.2960	\$1,125	\$ 3,990
	Commission			(\$20)	\$ 3,970
<hr/>					
End Balance	= \$ 3,970				
Gain/Loss	= \$250 - \$1,500 - \$375 + \$1,125 - \$20 = (\$520)				

Illustration-2 (EC Futures = €125,000)



Time	Action	Futures Price	Closing Price	Cash Flow	Account Balance
	Initial balance				\$ 3,240
Friday	Sell EC Future	1.4500	1.4540	(\$500)	\$ 2,740
Monday	Contract matures	1.4540	1.4520	\$250	\$ 2,990
(this is the last day trading)					
	Commission			(\$20)	\$ 2,970
End Balance		= \$ 2,990			
Net gain on future contract		= (\$500) + \$250 + (\$20) = (\$270)			
Client delivers		= €125,000			
Client receives from CH		= €125,000 x 1.452 = \$ 181,500			

Some Future Exchanges



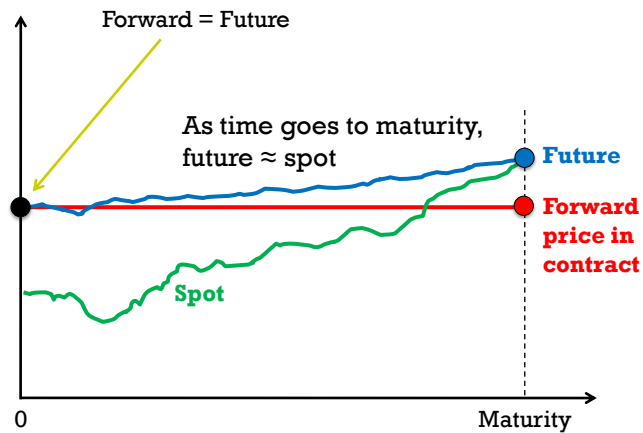
- ◉ CME = Chicago Mercantile Exchange
- ◉ LIFFE = London International Financial Future Exchange
- ◉ NYME = New York Mercantile Exchange
- ◉ PHLX = Philadelphia Stock Exchange
- ◉ SIMEX = Singapore International Monetary Exchange
- ◉ DTB = Deutsche Termin Borse (Frankfurt)
- ◉ HKFE = Hong Kong Future Exchange
- ◉ TIFFE = Tokyo International Financial Future Exchange
- ◉ JFX (BBJ) = Jakarta Futures Exchange (Bursa Berjangka Jakarta)

Forward and Futures



	FORWARD	FUTURE
Market	OTC	Organized Exchange
Contract (size, delivery date)	Customized	Standardized
Price in contract	Negotiation (once)	Mark to market (daily)
Pricing	Bid-ask quotation	Single price
Quotation (usually)	European term	American term
Collateral	Not required (common)	Margin requirement
Regulation	Self-regulating	Regulated by government
Guarantor	Contracting parties	Clearing House
Frequency of delivery	> 90% is delivered	< 1% is delivered

Spot, Forward and Future Price



Futures Hedging



- ◉ US company possesses a long of CHF 1,000,000 in the next months, and wants to hedge it.
- ◉ What should position be?

	USD/CHF	CHF/USD
Spot	1.4000	0.7143
30-day forward	1.4050	0.7117
30-day futures	1.4050	0.7117

- Sign Forward contract as CHF seller (sell SF Future)
- How many lots needed?
- How much initial margin needed?

Example: Future Contract



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Source: Chicago Mercantile Exchange (July 1st, 2008)

Future Hedging



- ◉ If prevailing spot rate = 0.7150, we will receive:

- Base contract = 1 mio x 0.7117 = \$ 711,700
- Cum settlement = 1 mio x (0.7117 – 0.7150) = (\$ 3,300)

= \$ 708,400

- ◉ If prevailing spot rate = 0.7100, we will receive:

- Base contract = 1 mio x 0.7117 = \$ 711,700
- Cum settlement = 1 mio x (0.7117 – 0.7100) = \$ 1,700

= \$ 713,400

Exercise-1



- ◉ What are the advantages of futures compare to forward?
- ◉ What are the problems that one encounters when hedging with futures?
- ◉ What are the roles of Clearing House in futures transaction?

Part-II

Currency Options



Introduction

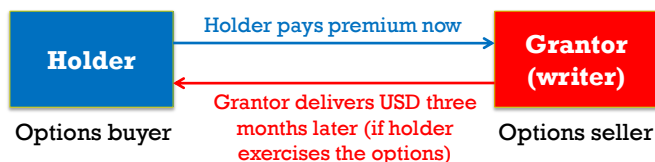


- ⊙ Options and Forward:
 - Forward = promise or obligation (it must be realized)
 - Options = right (it may or may not be realized)
- ⊙ Options contract gives buyer the right to buy or sell an asset in the future, at agreed price.
- ⊙ While Forward needs no cost, Options' buyer has to pay a premium.
- ⊙ While Forward is traded in OTC, Options is traded both either in OTC or organized exchange market.

Options



Holder buys a right to buy USD 100,000 with IDR at 8,600 in the next 3 months (December 7, 2011)



- ❑ USD 100,000 → Notional principal (NP)
- ❑ Exchange rate = USD/IDR = 8,600 → Strike (exercise) price
- ❑ At December 7th, 2011 → Maturity (expiration) date
- ❑ Holder pays 3% of NP → Premium

Premium can be quoted as domestic amount needed per 1 unit foreign currency, e.g. Rp. 300/\$

Options Style and Moneyness



Option Style:

- **European options:** can be realized only at maturity date.
- **American options:** can be realized anytime between writing date and maturity date.

Moneyness (exercise price and spot rate)

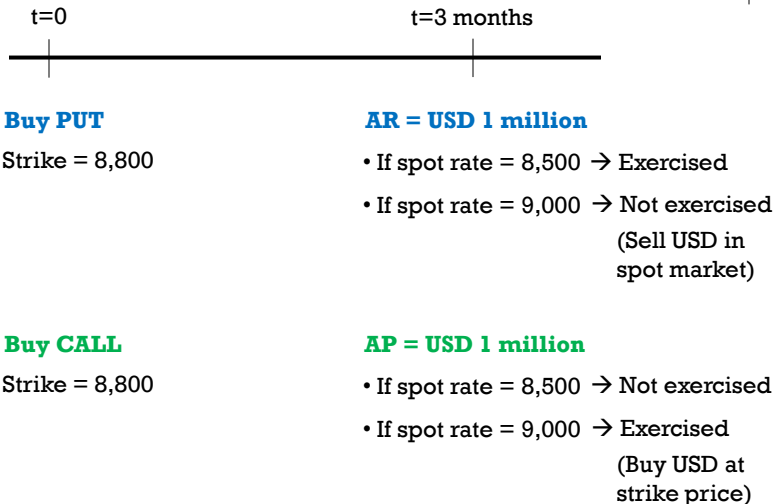
- **At-the-money (ATM)** → exercise price = future spot rate
- **In-the-money (ITM)** → if options is profitable
- **Out-of-the-money (OTM)** → If options is not profitable

CALL and PUT



	Right to buy CALL	Right to sell PUT
Buy	Buy CALL (buy the right to buy forex)	Buy PUT (buy the right to sell forex)
Sell	Sell CALL (sell the right to buy forex)	Sell PUT (sell the right to sell forex)

Hedging with Options



Example-1: Hedging



- ◉ An Indonesian company will make a payment of USD 1,000,000 in the next three months to its counterparty in US.
- ◉ Spot USD/IDR = 8,500; Call Strike = 8,650; Premium = 1.0%
- ◉ To hedge the receivable, company buy CALL Options for 3 months.
- ◉ Premium paid = USD 1 mio x 0.25% = USD 2,500 or IDR 21.25 mio.

In the next three months:

- ◉ If spot rate = 8,400 → Options = NOT EXERCISED
 - the company prefers to buy USD in the market at 8,400
 - if exercised, it is an out-of-the-money options
- ◉ If spot rate = 8,800 → Options = EXERCISED
 - the company buys USD at exchange rate of 8,650 (strike price)
 - it is in-the-money options

Example-2: Speculation



- I buy CALL Options with NP = USD 1,000,000 for 3 months
- Spot USD/IDR = 8,500; Call Strike = 8,650; Premium = 1.0%
- I pay = USD 1,000,000 x 0.25% = USD 2,500 or IDR 21.25 million.

In the next three months

- If spot rate = 8,400 → Options = NOT EXERCISED
 - I loss = IDR 21.25 million
- If spot rate = 8,800 → Options = EXERCISED
 - I buy USD at exchange rate of 8,650, then sell it in the spot market at 8,800.
 - Profit = 1,000,000 x (8,800 – 8,650) – 21.25 mio = IDR 128.75 mio

Options Logic



USD/IDR		Bid	Ask
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	3.0%	4.0%

- CALL → CALL
- PUT → PUT
- Banks always buy low, sell high
- Buy → Ask Premium
- Sell → Bid Premium

If I Bank	Buy CALL	Buy PUT	Sell CALL	Sell PUT
I have	Right to buy	Right to sell	Obligation	Obligation
Bank has	Obligation	Obligation	Right to buy	Right to sell
Premium paid by	Me	Me	Bank	Bank
Premium	Ask CALL Premium	Ask PUT Premium	Bid CALL Premium	Bid PUT Premium
Strike Price	Ask CALL	Bid PUT	Bid CALL	Ask PUT
If strike > spot	Not exercised	Exercised	Not exercised	Exercised
If strike < spot	Exercised	Not exercised	Exercised	Not exercised

Strike Price and Premium



		Bid	Ask
CALL	Strike	Sell CALL	Buy CALL
	Premium	Sell CALL	Buy CALL
PUT	Strike	Buy PUT	Sell PUT
	Premium	Sell PUT	Buy PUT

Exercise-2



A Thailand company will **make a payment of USD 1,000,000 in the next 3 months**. The company may protect its payable through: (1) money market, (2) forward market, or (3) options market.

Quotation		Bid	Ask	Rate (%p.a.)	USD	THB
Spot USD/THB		37.9000	38.4000	Loan rate	8.00%	12.00%
90-day forward		4.00%	8.00%	Time deposit rate	6.00%	10.00%
Call	Strike	37.9000	38.4000	WACC	---	16.00%
	Premium	8.00%	12.00%			
Put	Strike	37.9000	38.4000			
	Premium	2.00%	6.00%			

If prevailing spot rate in the next 3 months : 40.0000 – 40.5000, which alternative is preferable?

Exercise-3



A Thailand company will **receive USD 1,000,000 in the next 3 months**. The company may protect its receivable through: (1) money market, (2) forward market, or (3) options market.

Quotation		Bid	Ask	Rate (%p.a.)	USD	THB
Spot USD/THB		37.9000	38.4000	Loan rate	8.00%	12.00%
90-day forward		4.00%	8.00%	Time deposit rate	6.00%	10.00%
Call	Strike	37.9000	38.4000	WACC	---	16.00%
	Premium	8.00%	12.00%			
Put	Strike	37.9000	38.4000			
	Premium	2.00%	6.00%			

If prevailing spot rate in the next 3 months : 40.0000 – 40.5000, which alternative is preferable?

Answer: Exercise-3

AR = USD 1,000,000



Quotation	Bid	Ask	Rate (%p.a.)	USD	THB
Spot USD/THB	37.9000	38.4000	Loan rate	8.00%	12.00%
90-day forward	4.00%	8.00%	Time deposit	6.00%	10.00%
90-day forward	38.2790	39.1680	WACC	---	16.00%

Forward Market

• Total receive : USD 1,000,000 x 38.2790 = **THB 38,279,000**

Money Market

(borrow USD, USD → THB, invest THB, receive THB investment)

- Borrow USD : USD 1,000,000 / (1 + 8%/4) = USD 980,392
- USD → THB : USD 980,392 x 37.9000 = THB 37,156,863
- Invest in THB : THB 37,156,863 x (1 + 10%/4) = **THB 38,085,784**

Answer: Exercise-3

AR = USD 1,000,000

Quotation		Bid	Ask	Quotation		Bid	Ask
Call	Strike	37.9000	38.4000	Spot USD/THB		37.9000	38.4000
	Premium	8.00%	12.00%	Prevailing spot rate		40.0000	40.5000
Put	Strike	37.9000	38.4000	WACC = 16%			
	Premium	2.00%	6.00%				

Options Market → Buy PUT

- Premium paid : USD 1,000,000 x 6%/4 = USD 15,000
- Premium paid in THB : USD 15,000 x 38.4 = THB 576,000
- FV Premium paid : THB 576,000 x (1+16%/4) = THB 599,040

Prevailing spot rate : 40.0000 → options is not exercised

- Sell USD at spot market : USD 1,000,000 x 40.0000 = THB 40,000,000
- Total receivable : THB (40 mio – 599,040) = **THB 39,400,960**

Exercise-4

An Indonesia company needs additional working capital of IDR 1 billion for 6 months, by borrowing from bank. The quotations are below:

Quotation		Bid	Ask
Spot USD/IDR		8,500	9,000
180-day forward		4%	6%
Call ATM	Premium	1%	2%
Put ATM	Premium	2%	4%
USD loan rate: 5% p.a.			
IDR loan rate: 23% p.a.			

How is the best and safe way to borrow if:

- ⊙ Projected spot rate: 8,800 – 9,300?
- ⊙ Projected spot rate: 8,500 – 9,000?

Answer: Exercise-4



⊙ Borrow in IDR

- Amount : IDR 1,000,000,000
- Pay in 6 months : $\text{IDR } 1 \text{ bio} \times (1 + 23\%/2) = \text{IDR } 1.115 \text{ bio}$
- No hedging because of no foreign exchange exposure

⊙ Borrow in USD

- Amount : $\text{IDR } 1 \text{ bio} / 8,500 = \text{USD } 117,647$
- Pay in 6 months : $\text{USD } 117,647 \times (1 + 5\%/2) = \text{USD } 120,588$
- Hedging is needed because of USD exposure

⊙ Hedging with Forward or Options?

Answer: Exercise-4



Quotation		Bid	Ask	Interest Rate
Spot USD/IDR		8,500	9,000	
180-day forward		8,670	9,270	USD loan rate: 5% p.a.
Call ATM	Premium	1%	2%	IDR loan rate: 23% p.a.
Put ATM	Premium	2%	4%	WACC: 15% p.a.

⊙ Hedging with Forward:

- Amount : USD 120,588
- Pay in 6 months : $\text{USD } 120,588 \times 9,270 = \text{IDR } 1,117,852,941$

⊙ Hedging with Options:

- Buy Call → Strike = 9,270 and Premium = 2%
- Premium : $\text{USD } 120,588 \times 2\%/2 = \text{USD } 1,206$
- Premium in IDR : $\text{USD } 1,206 \times 9,000 = \text{IDR } 10,852,941$
- FV Premium : $\text{IDR } 10,852,941 \times (1 + 15\%/2) = \text{IDR } 11,67 \text{ mio}$

Answer: Exercise-4



- ⊙ **Projected spot rate: 8,800 – 9,300**
 - CALL options is exercised (strike = 9,270)
 - Options realization : USD 120,588 x 9,270 = IDR 1.118 bio
 - FV premium : IDR 11.67 mio
 - Pay in 6 months : **IDR 1,129, 519, 853**
 - ANSWER : **BORROW IN IDR**
- ⊙ **Projected spot rate: 8,500 – 9,000**
 - CALL options is not exercised (strike = 9,270)
 - Options realization : USD 120,588 x 9,00 = IDR 1.085 bio
 - FV premium : IDR 11.67 mio
 - Pay in 6 months : **IDR 1,096,961,029**
 - ANSWER : **BORROW IN USD WITH OPTIONS**

Exercise-5



- ⊙ PT. Mega Finance, a trader in foreign exchange market, buys 6-months Call options from BCA at strike price USD/IDR = 8,632 (premium = 6% and notional principle = USD 400 million).
In order to square up its position, BCA plans to buy an options from Deutsche Bank with similar notional principle. Below are the quotations from Deutsche Bank:

USD/IDR		Bid	Ask
Call	Strike	8,500	8,550
	Premium	4.0%	6.0%
Put	Strike	8,600	8,650
	Premium	10%	12%

- ⊙ Calculate BCA's gain/loss at maturity if the prevailing spot rate: 8,600 – 8,650.

Answer: Exercise-5



USD/IDR		Bid	Ask
Call	Strike	8,500	8,550
	Premium	4.0%	6.0%
Put	Strike	8,600	8,650
	Premium	10%	12%



Mega Finance buys CALL options from BCA:

- Strike : 8,632
- Premium : 6%
- NP : \$ 400,000
- Maturity : 6 months

BCA buy CALL options from Deutsche Bank:

- Strike : 8,550
- Premium : 6%
- NP : \$ 400,000
- Maturity : 6 months

Answer: Exercise-5



Prevailing spot rate USD/IDR: 8,600 – 8,650

◉ Mega Finance → hedging

- Mega Finance exercises CALL options (buy USD from BCA)
- BCA sells USD to Mega Finance at 8,632
- BCA buys USD from Deutsche Bank at 8,550
- BCA's profit = $(8,632 - 8,550) \times \text{USD } 400,000 = \text{IDR } 32.8 \text{ mio}$

◉ Mega Finance → speculator

- Mega Finance = not exercised, but BCA = exercise
- BCA buys USD from Deutsche Bank at 8,550
- Sell USD to customer = $(8,650 - 8,550) \times 400,000 = \text{IDR } 40 \text{ mio}$
- Offer USD to Deutsche = $(8,600 - 8,550) \times 400,000 = \text{IDR } 20 \text{ mio}$

Options in Exchange Market



- ◉ Exchange-traded currency options were first offered in 1983 by the PHLX (Philadelphia Stock Exchange).
- ◉ PHLX options are available in six currencies: AUD, GBP, CAD, EUR, JPY, and CHF.
- ◉ The exchanges create and list options price.
- ◉ Options price = options value = options premium.

Example: Options Contract



Contract Items	AUD	GBP	EUR	CHF
Symbol	XAD/CAD	XBP/CBP	XEU/XCU	XSF/CSF
Contract size	A\$50,000	£31,250	€62,500	CHF62,500
Min price change	\$ 0.0001	\$ 0.0002	\$ 0.0001	\$ 0.0001
Value of 1 pips	\$ 5.00	\$ 3.125	\$ 6.25	\$ 6.25
Months traded	Mar, Jun, Sep, Dec + two near-term months			
Trading hour	Mon-Friday: 02.30 am – 02.30 pm (Philadelphia time)			
Expiration date	• Mar, Jun, Sep, Dec = Third Wednesday • Otherwise = Third Thursday			

Example: Options Quotation (CHF/0.01 USD)



Options & Spot Rate	Strike Price	CALL			PUT		
		Aug	Sep	Dec	Aug	Sep	Dec
58.51	56.0	-	-	2.76	0.04	0.22	1.16
58.51	56.5	-	-	-	0.06	0.30	-
58.51	57.0	1.13	-	1.74	0.10	0.38	1.27
58.51	57.5	0.75	-	-	0.17	0.55	-
58.51	58.0	0.71	1.05	1.28	0.27	0.89	1.81
58.51	58.5	0.50	-	-	0.50	0.99	-
58.51	59.0	0.30	0.66	1.21	0.90	1.36	-
58.51	59.5	0.15	0.40	-	2.32	-	-
58.51	60.0	-	0.31	-	2.32	2.62	3.30

1 CHF=\$0.5851

Premium

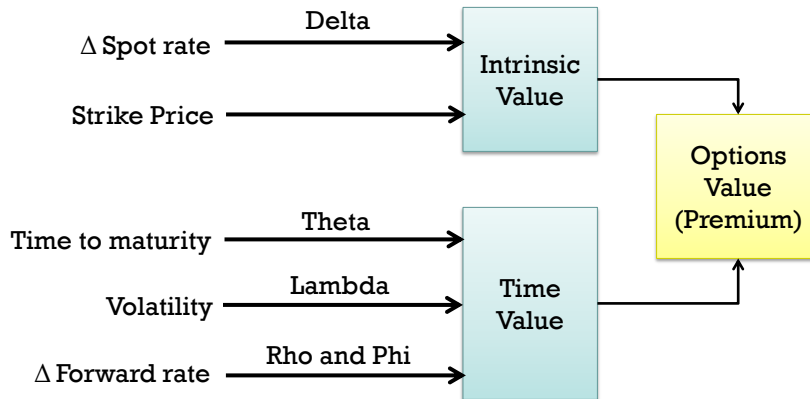
\$0.50 per CHF

Options Value



- Options value, i.e. **premium**, comprises of intrinsic value plus time value.
- Intrinsic value** is financial gain if options is exercised immediately.
 - Intrinsic value = Spot rate – strike price
 - If options is ITM, intrinsic value > 0, otherwise equals zero.
- Time value** is potential financial gain due to the probability of options to be more ITM.
 - The longer time to maturity, the higher time value is
 - As options moves to maturity, time value moves toward zero

Options Value Determinants



Options Value Sensitivities



Components	Symbol	CALL Premium	PUT Premium
Δ Spot rate	Delta	+	-
Δ Home interest rate	Rho	+	-
Δ Foreign interest rate	Phi	-	+
Δ Forward rate		+	-
Strike price		-	+
Time to maturity	Theta	+	+
Volatility	Lambda	+	+

Black and Scholes Model



$$\text{Call Premium} = e^{-i_f \cdot T} \cdot S \cdot N(d_1) - e^{-i_h \cdot T} \cdot E \cdot N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S}{E}\right) + \left(i_h - i_f + \frac{\sigma^2}{2}\right) \cdot T}{\sigma \sqrt{T}}$$

$$d_2 = d_1 - \sigma \sqrt{T}$$

- S = spot rate (f/h)
- E = exercise (strike) price
- T = time to maturity / 360
- i_h = home interest rate
- i_f = foreign interest rate
- σ = standard deviation of asset price
- N = cumulative normal distribution
- e = exponential = 2.71828



Part-IV Complex Options

Introduction



- ⊙ Vanilla and Exotic Options
 - **Vanilla options:** basic options with standardized CALL/PUT, preset strike price, and specific expiration date.
 - **Exotic options:** options with has more complex features (e.g. Asian options, look-back options, barrier options etc).
- ⊙ Combination of two opposite options
 - Purpose: **reduce or zero the premium**
 - Structure:
 - **AR → buy PUT and sell CALL**
 - **AP → buy CALL and sell PUT**
 - E.g. synthetic forward, ratio spread options, range forward.

Exotic Options: Asian Options



- ⊙ **Average Strike Options (ASO)**
 - Strike Price = average of spot rate during the life of options
 - Exercised if Strike Price > Spot rate at maturity (for PUT)
- ⊙ **Average Rate Options (ARO)**
 - Strike Price = preset (as usual)
 - Exercised if Strike Price > Average of spot rate during the life of options (for PUT)
- ⊙ ASO and ARO's premiums are cheaper than European style options.

Example of Exotic Options

Assume: strike Price of Vanilla Options USD/IDR = 8,600



Week	USD/IDR	USD/IDR	USD/IDR	USD/IDR
0	8,500	8,700	8,500	8,700
1	8,550	8,650	8,600	8,600
2	8,600	8,600	8,700	8,500
3	8,650	8,550	8,650	8,550
4	8,700	8,500	8,600	8,650

ASO:

X

V

V

X

• Strike

8,625

8,575

8,638

8,575

• End of spot

8,700

8,500

8,600

8,650

ARO:

X

V

X

V

• Strike

8,600

8,600

8,600

8,600

• End of spot

8,625

8,575

8,638

8,575

Other Exotic Options



- ◉ **Look-back Options.** Strike price = the lowest spot rate for CALL options, or the highest spot rate for PUT options during the life of options → **hindsight options**. (commonly used when markets are volatile).
- ◉ **Barrier Options.** Options will be exercised automatically if spot rate hits a certain level.
- ◉ **Chooser Options.** We can choose whether the options is a PUT or a CALL several days before expiration date → “as you like it” options
- ◉ **Etc.**

Combination of Two Options



- ◉ **Synthetic forward** is a combination of two opposite options with the same strike price (this will reduce upfront premium paid).
- ◉ **Ratio Spread Options** is a combination of two opposite options with the same strike price in which the NP is modified so that the net premium equals zero.
- ◉ **Range Forward** is a combination of two opposite options to create a tunnel by employing two difference strike prices around forward rate, so that the net premium equals zero.

Case



- ◉ An Indonesian company will receive USD 1,000,000 in the next 3 months. It wants to hedge the AR by reducing upfront premium, or even zeroing it.

USD/IDR		Bid	Ask
Spot rate		8,000	8,200
3-month forward		8,300	8,500
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	2.0%	4.0%
WACC = 15%			

Example: Synthetic Forward



USD/IDR		Bid	Ask
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	2.0%	4.0%

	Strike	Premium	NP	Tot. Premium	Note
Buy PUT	8,400	4.0%/4	\$1,000,000	\$10,000	Paid
Sell CALL	8,400	1.0%/4	\$1,000,000	\$2,500	Receive

Prevailing spot	PUT	CALL	Action in the next three months
8,300	V	X	I exercise PUT Options (Bank = not exercise) I sell \$1 mio at 8,400 → I receive = IDR 8.4 bio
8,500	X	V	Bank exercises CALL Options (I = not exercise) Bank buys \$1 mio at 8,400 → I receive = IDR 8.4 bio

Example: Synthetic Forward



USD/IDR		Bid	Ask
Spot rate		8,000	8,200
3-month forward		8,500	8,700
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	2.0%	4.0%
WACC = 15%			

- Net premium

Net premium

FV net premium

= (USD 7,500)

= (USD 7,500 x 8,200) = (IDR 61,500,000)

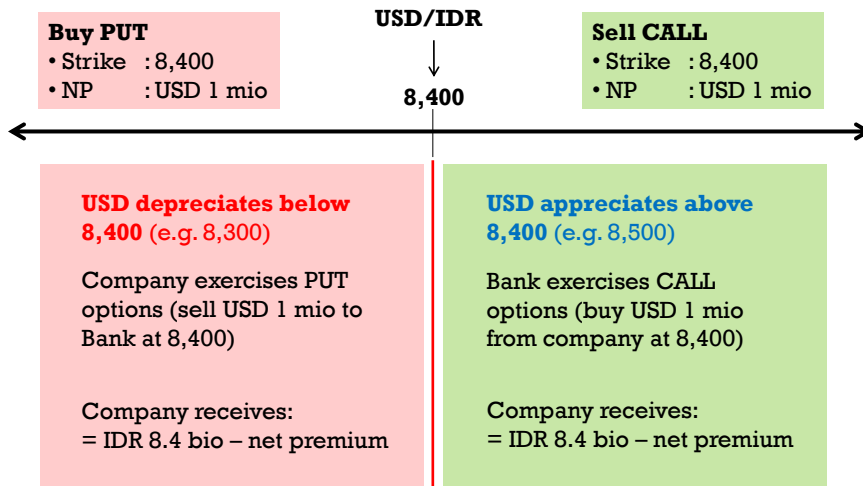
= (IDR 61,5 mio) x (1+15%/4) = **(IDR 63,806,250)**
- Option realization

= USD 1,000,000 x 8,400 = **IDR 8,400,000,000**
- Total receivable

= IDR 8,400,000,000 – IDR 63,806,250

= **IDR 8,336,193,750**

Illustration: Synthetic Forward



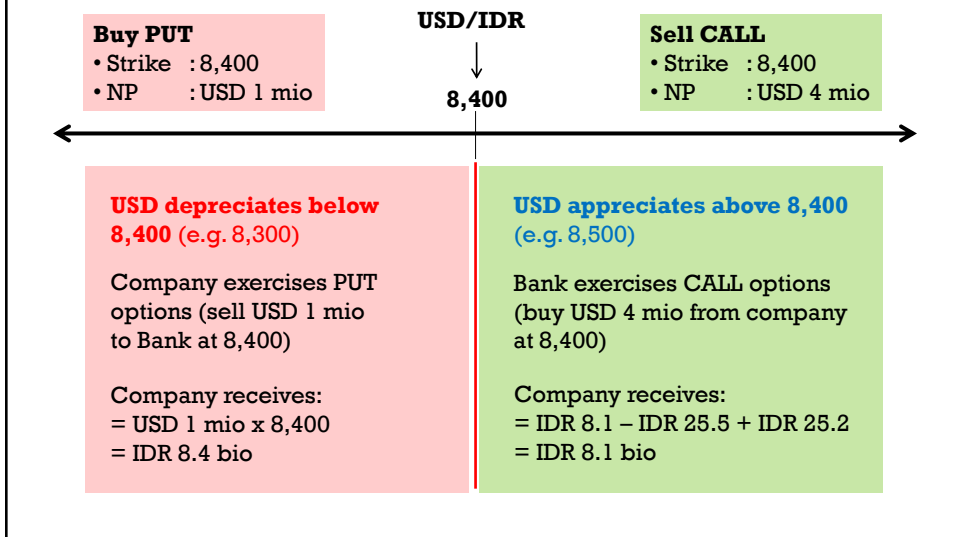
Example: Ratio Spread Options



USD/IDR		Bid	Ask
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	2.0%	4.0%

	Strike	Premium	NP	Tot. Premium	Note
Buy PUT	8,400	1.0%	\$1,000,000	\$10,000	Paid
Sell CALL	8,400	0.25%	\$4,000,000	\$10,000	Receive

Prevailing spot	PUT	CALL	Action in the next three months
8,300	V	X	Sell \$1 mio at 8,400 → receive = IDR 8.4 bio
8,500	X	V	Sell \$1 mio at 8,400 → receive = IDR 8.4 bio Buy \$3 mio at 8,500 → pay = IDR 25.5 bio Sell \$3 mio at 8,400 → receive = IDR 25.2 bio

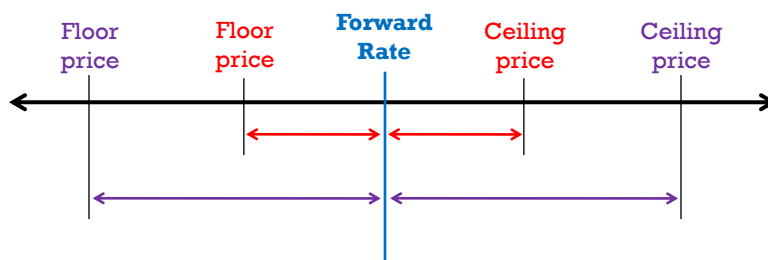


- Look back Exercise-2 and Exercise-3.
- Which hedging alternative is preferable if synthetic forward and ratio spread are included?

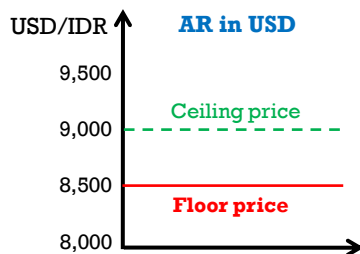
Range Forward



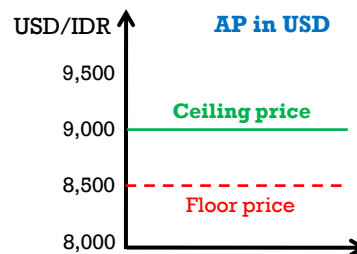
- ◉ **Range Forward** is combination of two options to create a tunnel by employing two different strike prices.
- ◉ One strike price is set by client. Another price is set by bank such that **the net premium equals zero**.



Range Forward



Range Forward:
 • Buy PUT
 • Sell CALL



Range Forward:
 • Buy CALL
 • Sell PUT

Example: Range Forward



USD/IDR		Bid	Ask
Spot rate		8,000	8,200
3-month forward		8,300	8,500
CALL	Strike	8,400	8,600
	Premium	1.0%	2.0%
PUT	Strike	8,400	8,600
	Premium	2.0%	4.0%

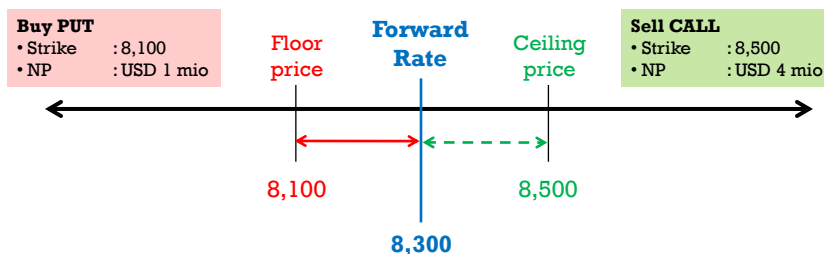
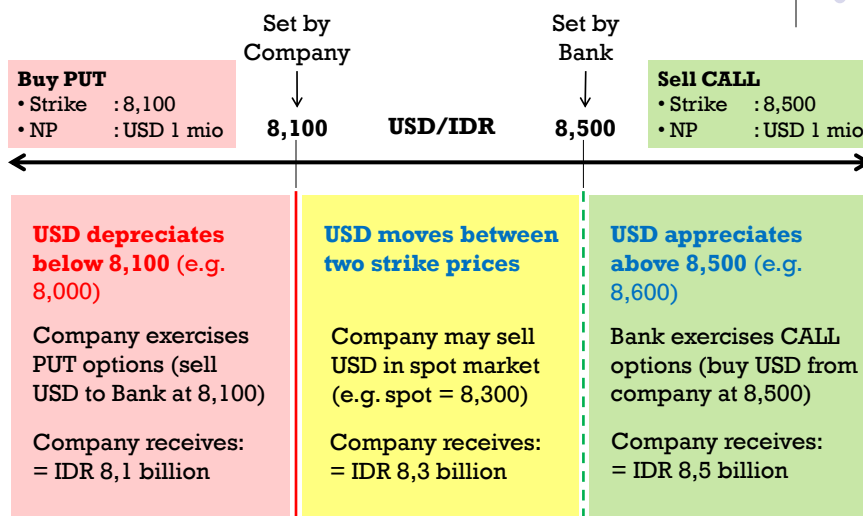


Illustration: Range Forward





Should We Fear Derivative?



Assignment Questions

- What factors did influence the significant growth of derivative use in 1970s?
 - The collapse of fixed exchange rate system (Bretton Woods) → hedging, speculative, arbitrageur
 - Options pricing formula (Black & Scholes, 1973) → apply in many assets
 - Traded in organized exchange
- What are benefits of derivative?
 - Provide more simple and cheap portfolio for nonfinancial firm
 - Make asset market more efficient
 - Take advantage position quicker

Assignment Questions



- ⊙ Two models to value a derivative: formula (OTC) and mark-to-market (organized exchange). What are the problems for each model?
 - Formula → basic assumptions are not achieved
 - Mark-to-market → irrational behaviors
- ⊙ How to use derivative safely?
 - Realize that derivatives also create risk
 - Know the risks, especially for exotic and complex instruments (difficult to value, and difficult to sell)
 - If lack of experiences, avoid to use exotic and complex instruments

