

Problem 2

In the 1980s, Bankers Trust developed index currency option notes (ICONs). These are bonds in which the amount received by the holder at maturity varies with a foreign exchange rates.

One example was its trade with the Long Term Credit Bank of Japan.

S_T - the yen - U.S. dollar exchange rate

The ICONs specified that if:

* $S_T > 169$ yen per dollar at maturity (in 1995), the payoff: \$1,000

* $84.5 \leq S_T \leq 169$ yen per dollar, the payoff: $1,000 - \max \left[0, 1,000 \left(\frac{169}{S_T} - 1 \right) \right] = 2,000 - \frac{169,000}{S_T}$

* $S_T < 84.5$ yen per dollar, the payoff: 0

ICONs is combination of a regular bond and two options (short calls & long calls)

short calls: $-169,000 \left(\frac{1}{S_T} - \frac{1}{169} \right)$ long calls: $+169,000 \left(\frac{1}{S_T} - \frac{1}{84.5} \right)$

$\underbrace{\hspace{10em}}_{\text{call option's buy}} \quad \quad \quad \underbrace{\hspace{10em}}_{\text{exercise price}} \quad \quad \quad \underbrace{\hspace{10em}}_{\text{exercise price}} \quad \quad \quad \underbrace{\hspace{10em}}_{\text{exercise price}}$

@ $S_T > 169$, short calls = 0 & long calls = 0

\therefore payoff = regular bond + short calls + long calls = \$1,000

@ $84.5 \leq S_T \leq 169$, long calls = 0

\therefore payoff = regular bond + short calls = $1,000 + \left(-169,000 \left(\frac{1}{S_T} - \frac{1}{169} \right) \right) = 2,000 - \frac{169,000}{S_T}$

@ $S_T < 84.5$

payoff = regular bond + short calls + long calls

$$= 1,000 + \left(-169,000 \left(\frac{1}{S_T} - \frac{1}{169} \right) \right) + \left(+169,000 \left(\frac{1}{S_T} - \frac{1}{84.5} \right) \right)$$

$$= 2,000 - \frac{169,000}{S_T} + \frac{169,000}{S_T} - 2,000 = 0$$

Problem 3

On July 1, 2011, a company enters into a forward contract to buy 10 million Japanese Yen on January 1, 2012. On September 1, 2011, it enters into a forward contract to sell 10 million Japanese Yen on January 1, 2012.

S_T - price of Japanese Yen on January 1, 2012 (spot price)

F_1 - forward price on July 1, 2011 for the forward contract to buy on January 1, 2012

F_2 - forward price on September 1, 2011 for forward contract to sell on January 1, 2012

The total payoff from this strategy

$$\underbrace{10,000,000 (S_T - F_1)}_{\text{buys}} + \underbrace{10,000,000 (F_2 - S_T)}_{\text{sells}}$$

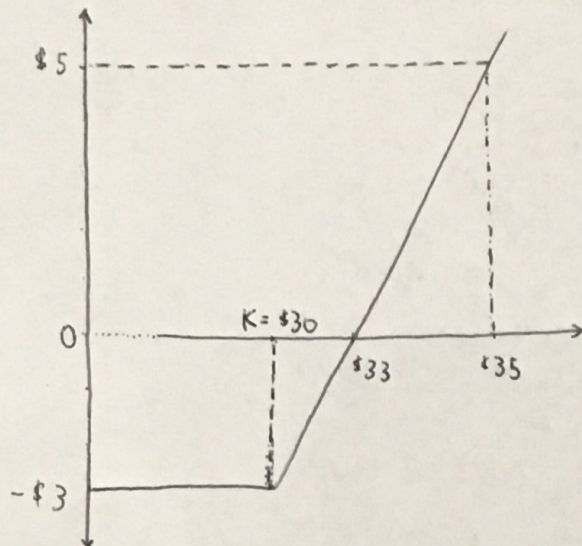
$$= 10,000,000 (F_2 - F_1)$$

So if the forward price to sell, F_2 , is greater than the buying forward price, F_1 , then the company will gain the difference times the 10 million Japanese Yen they invested.

Problem 4

Buy a call option

strike price, $K = \$30$ for $\$3$



The trader could lose money on the trade when the stock price is below \$33. Let's say that the trader have \$3,000 to invest. If the trader invest in the call option and to buy 1,000 options, then if the share

price goes up to $\$31 \rightarrow [1,000 (\$31 - \$30)] - \$3,000 = -\$2,000$

$\$32 \rightarrow [1,000 (\$32 - \$30)] - \$3,000 = -\$1,000$

$\$33 \rightarrow [1,000 (\$33 - \$30)] - \$3,000 = 0$

~~After~~ If the stock price goes up to greater than \$33 then the trader would start to make a profit from his call option buys.