Example 11.1

North American Bank has originated a portfolio of loans. North American knows that the aggregate payoff on this portfolio will be $100 with a probability of 0.9 and $30 with a probability of 0.1. Suppose investors cannot tell the difference between this portfolio and another portfolio from First United Bank. First United's portfolio has a payoff of $100 with a probability of 0.7 and $30 with a probability of 0.3. Investors believe that it could be either portfolio with a probability of 0.5.

Suppose the bank can communicate the true value of its loan portfolio at a cost of $11 (a signaling cost). North American's net profit from loan origination and servicing is 1% of the true value of the securitized loan portfolio.

If the loans are kept on the books and funded by the bank, the bank's net profit is 2% of the true value of the loan portfolio minus a fixed cost of 99 cents associated with funding.

(1) Will North American prefer to securitize or fund its loan portfolio?

(2) Suppose now the communication costs fall to $5. Will the bank securitize or fund its portfolio?

(3) Find the communication cost c^* where the bank is indifferent between communicating and not communicating.

(4) Find the communication cost c^{**} where the bank is indifferent between securitizing and funding.

(5) Beginning at $c = 0$ to $c = c^{**}$, find the values of c for which choice is best for the bank.

GIVEN INFORMATION

$B(NA) = \$100$	$B(FU) = \$100$	$P(NA) = 0.5$
$P(B\|NA) = 0.9$	$P(B\|FU) = 0.7$	$P(FU) = 0.5$
$W(NA) = \$30$	$W(FU) = \$30$	$C = \$11$ ★COULD BE GIVEN AS PERCENT LIKE HOMEWORK 7
$P(W\|NA) = 0.1$	$P(W\|FU) = 0.3$	$N\Pi(S) = 0.01$
		$N\Pi(F) = 0.02$
		$FC(F) = \$0.99$

a) FIND TVs (FOR EASIER CALCULATIONS LATER)

$TV(NA) = n(NA)[P(B|NA)B(NA) + P(W|NA)W(NA)]$
$= 1[0.9(100) + 0.1(30)]$
$= \$93$

$TV(FU) = n(FU)[P(B|FU)B(FU) + P(W|FU)W(FU)]$
$= 1[0.7(100) + 0.3(30)]$
$= \$79$

FIND MV_{NC}

$MV_{NC} = P(NA)TV(NA) + P(FU)TV(FU)$
$= 0.5(93) + 0.5(79)$
$= \$86$

FIND $MV_C(NA)$

$MV_C(NA) = TV(NA) - C$
$= 93 - 11$
$= \$82$

DETERMINE COMMUNICATION PREFERENCE

SINCE $MV_{NC} > MV_C(NA)$, NA PREFERS NOT TO COMMUNICATE.

FIND $\Pi(S)$ (USE PREFERENCE FROM ABOVE)

$\Pi(S) = N\Pi(S)MV_{NC}$
$= 0.01(86)$
$= \$0.86$

FIND $\Pi(F)$

$\Pi(F) = N\Pi(F)TV(NA) - FC(F)$
$= 0.02(93) - 0.99$
$= \$0.87$

DETERMINE SECURITIZATION PREFERENCE

SINCE $\Pi(F) > \Pi(S)$, NA PREFERS FUNDING.

b) GIVEN INFORMATION

$C_1 = \$5$ ★THIS WILL CHANGE $MV_C(NA)$ AND $\Pi(S)$.

FIND NEW $MV_C(NA)$

$MV_C(NA) = TV(NA) - C_1$
$= 93 - 5$
$= \$88$

DETERMINE COMMUNICATION PREFERENCE

SINCE $MV_C(NA) > MV_{NC}$, NA PREFERS TO COMMUNICATE WITH THE LOWER COST.

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GIVEN INFORMATION

$B(NA) = \$100$	$B(FU) = \$100$	$P(NA) = 0.5$
$P(B\|NA) = 0.9$	$P(B\|FU) = 0.7$	$P(FU) = 0.5$
$W(NA) = \$30$	$W(FU) = \$30$	$c = \$11$ * COULD BE GIVEN AS PERCENT LIKE HOMEWORK 7
$P(W\|NA) = 0.1$	$P(W\|FU) = 0.3$	$N\pi(S) = 0.01$
		$N\pi(F) = 0.02$
		$FC(F) = \$0.99$

FIND $\pi(S)$

$\pi(S) = N\pi(S) MV_C(NA)$

$= 0.01(88)$

$= \$0.88$

DETERMINE SECURITISATION PREFERENCE

SINCE $\pi(S) > \pi(F)$, NA PREFERS TO COMMUNICATE WITH THE LOWER COST.

c) BANK IS INDIFFERENT WHEN $MV_{NC} = MV_C$

$MV_{NC} = TV(NA) - c^*$

$86 = 93 - c^*$

$c^* = \$7$

d) BANK IS INDIFFERENT WHEN $\pi(F) = \pi(S)$

$\pi(F) = N\pi(S) MV_C(NA)$

$\pi(F) = N\pi(S)[TV(NA) - c^{**}]$

$0.87 = 0.01(93 - c^{**})$

$c^{**} = \$6$

e) FROM $c=0$ TO $c=7$, THE BEST OPTION IS TO COMMUNICATE. AND, FROM $c=0$ TO $c=6$, THE BEST OPTION IS TO SECURITIZE.