

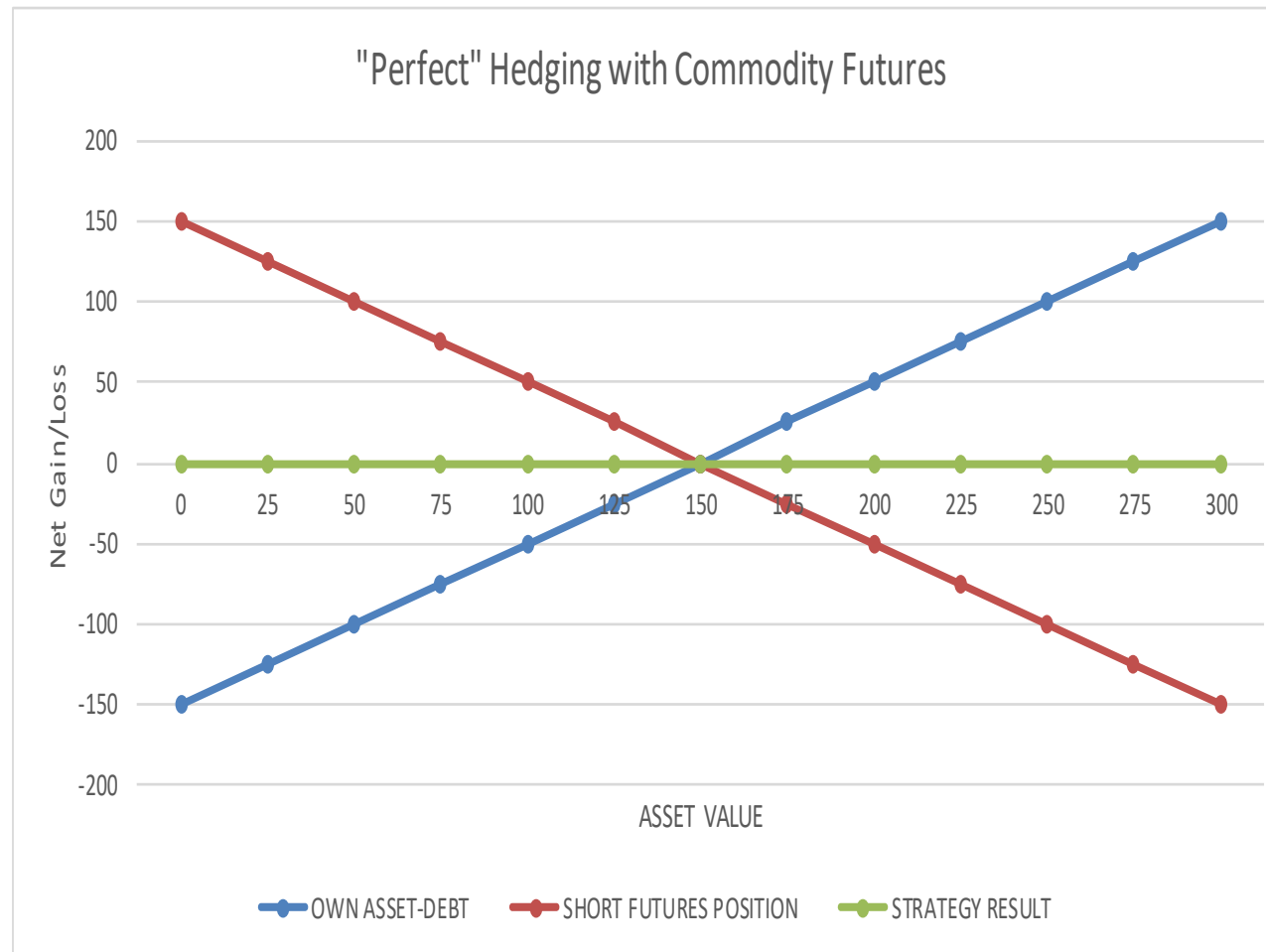
Chapter 3

Real option payoffs and position strategies

HEDGING WITH FUTURES

- LEVERAGED ENTERPRISE HAS “EXPOSED” PHYSICAL POSITION (OILCO LONG IN CRUDE OIL)
- AS SHORT HEDGER, ASSUMES A SHORT POSITION IN OIL FUTURES
- “BONA FIDE” HEDGING PHYSICAL CLOSE TO FUTURES (ASSET, TIMING, AMOUNT)
- EXPOSED TO BASIS, TIMING, DELIVERY-TERMINATION, LIQUIDITY RISK

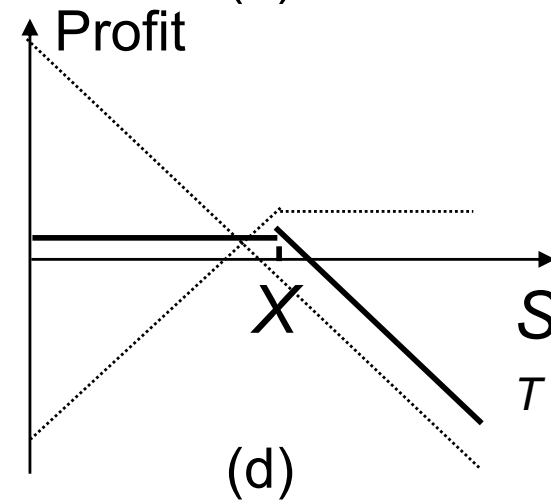
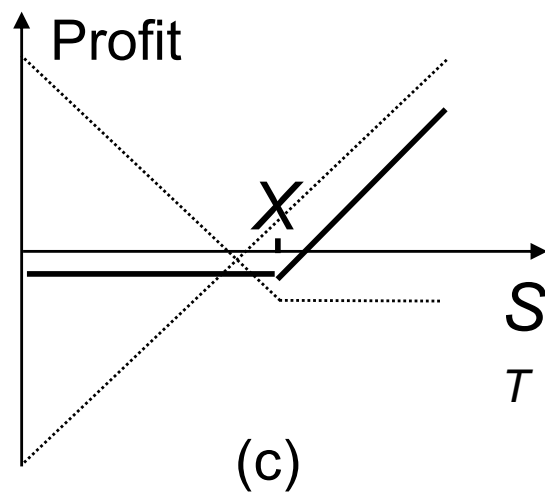
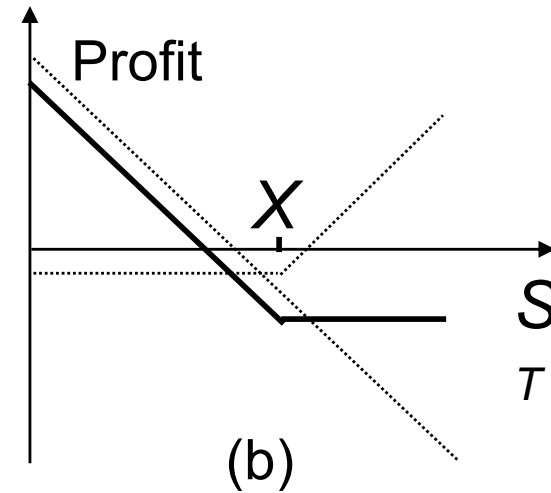
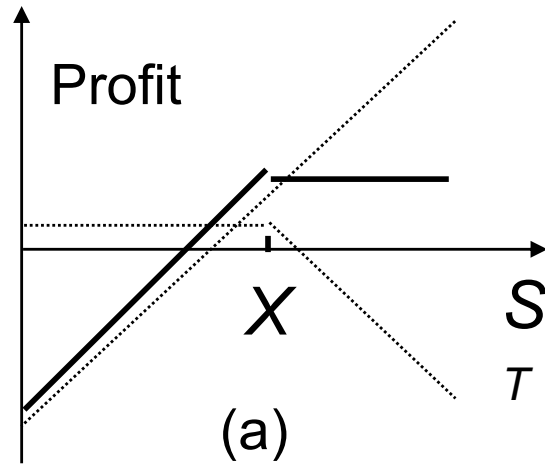
"PERFECT" HEDGING WITH FUTURES



Position strategies involving real and commodity options

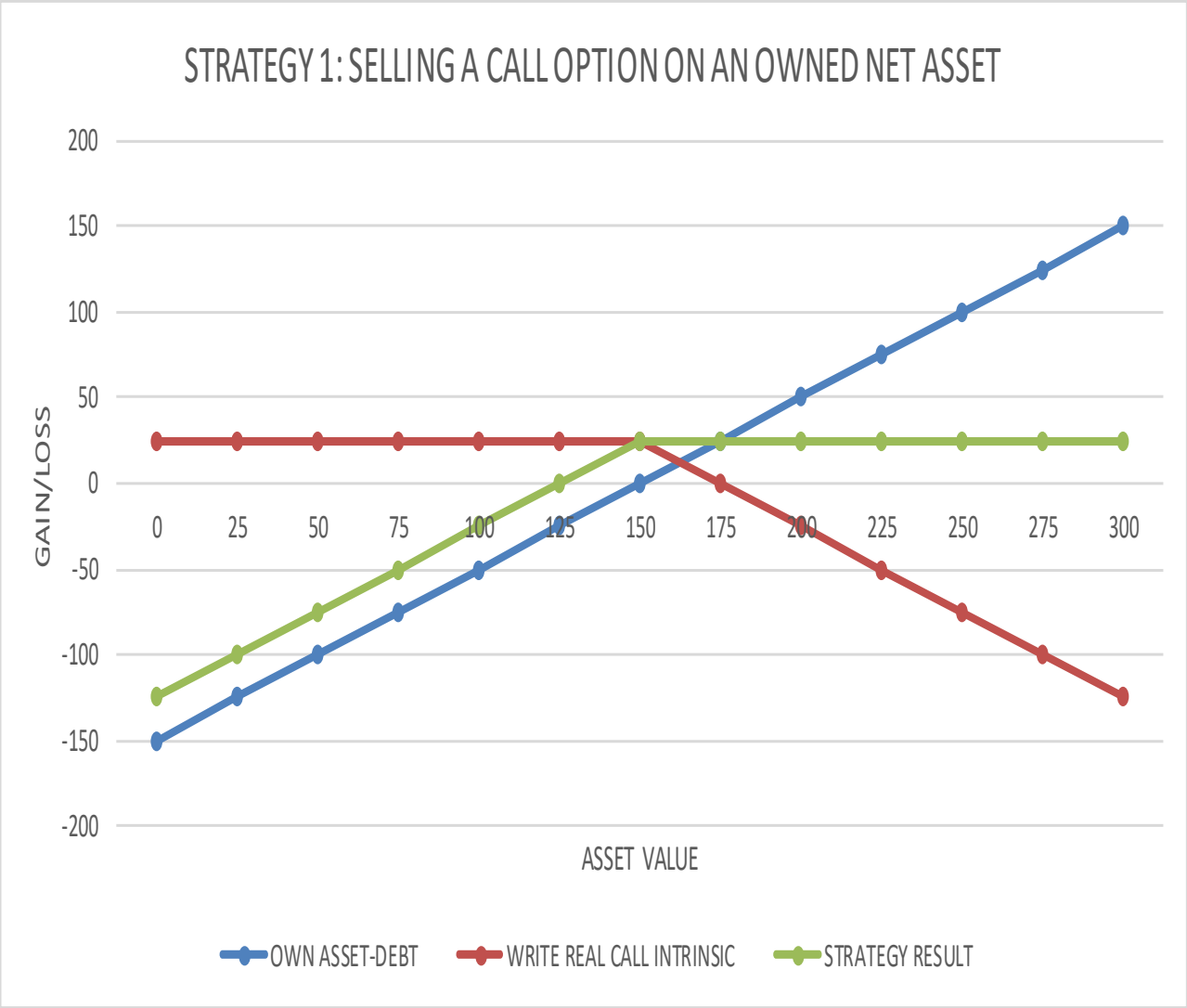
- Establish a position in the real option and the underlying
- Spread: position in two or more real options of the same type
- Combination: position in a mixture of real and commodity calls and puts

Positions in a real option and the underlying net asset



Marketing Strategy

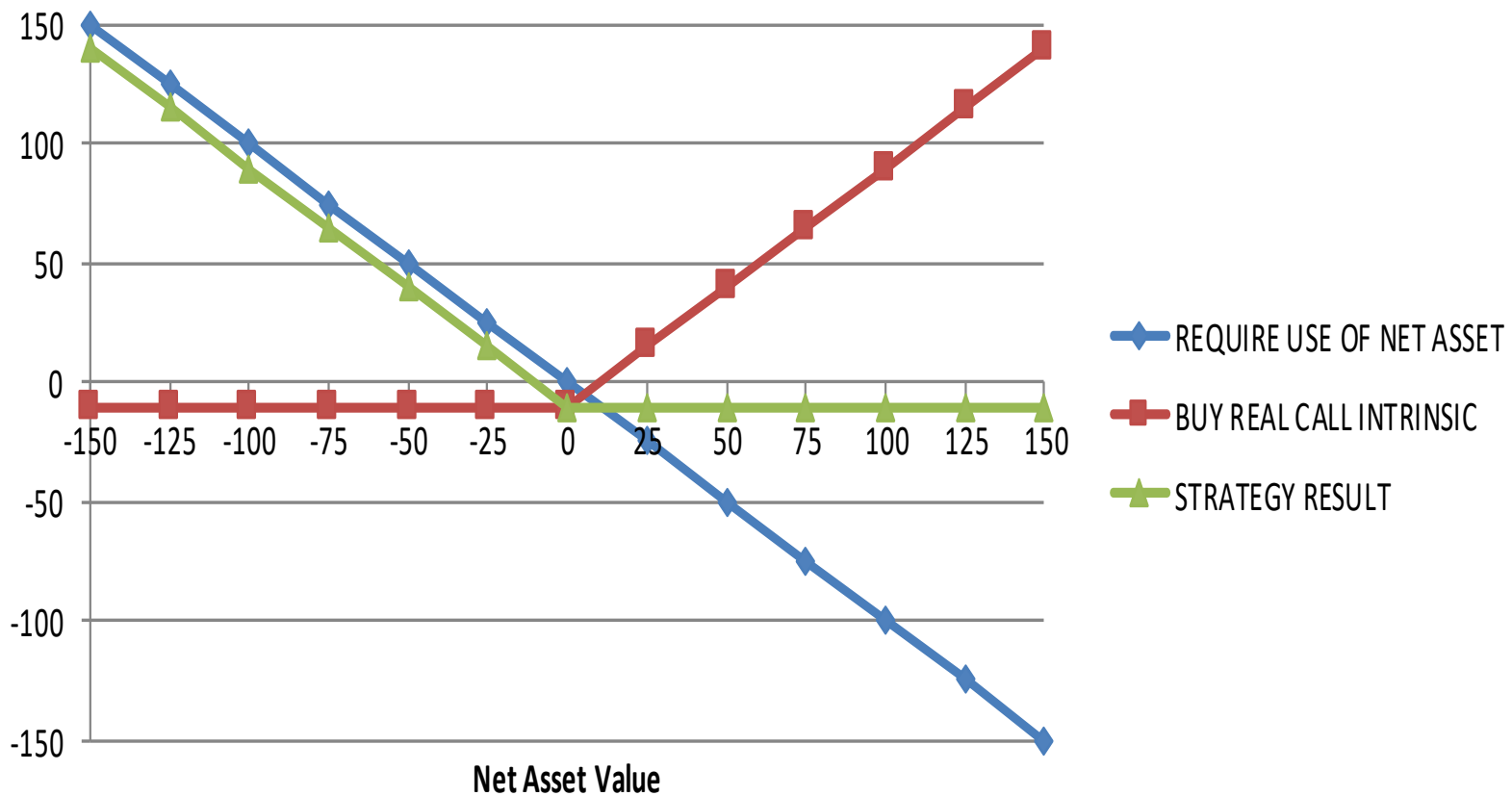
- 1. Own an asset subject to debt, give a third party investor the right to buy the net asset at nil cost (if today $\text{asset} - \text{debt} = 0$) for an immediate payment of an option premium.
- Strategy result equals writing a real put on the net asset value.



Protective User Strategy

- 2. You are required or committed to use an asset subject to debt, and seek protection against increases in the price of that net asset.
- Buy a real call option to purchase that net asset at nil cost, if net asset currently worth 0, for an immediate payment of an option premium.
- Strategy result is a real put on the net asset value.

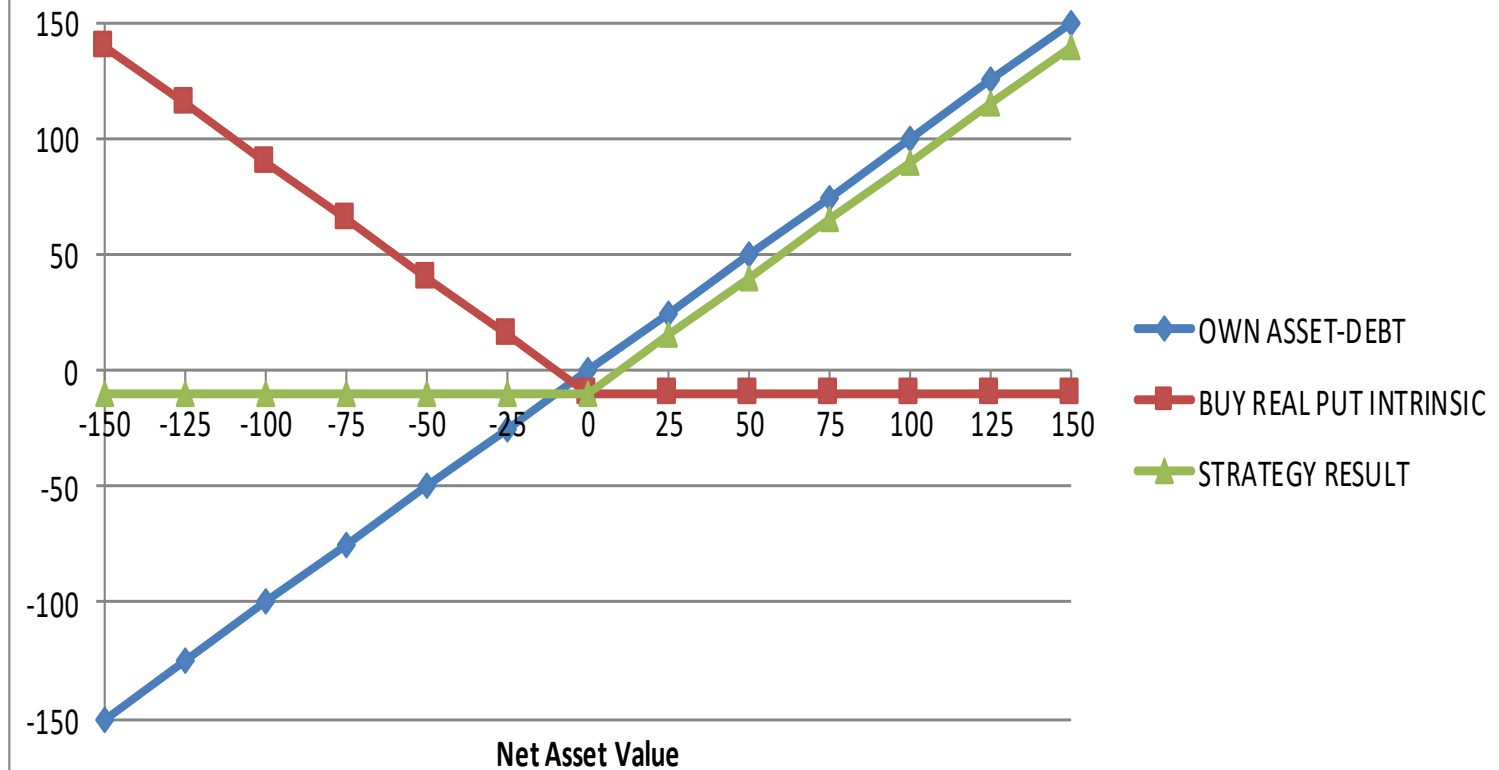
STRATEGY 2: BUYING PROTECTIVE CALL TO COVER REQUIREMENT TO USE NET ASSET



Protective Owner Strategy

- 3. Own an asset subject to debt, buy the right to sell to a third party the asset at the debt amount (if today asset – debt=0) for an immediate payment of an option premium.
- Strategy result equals buying a real call on the net asset value at nil exercise cost.

STRATEGY 3: BUYING PROTECTIVE PUT TO COVER OWNED NET ASSET

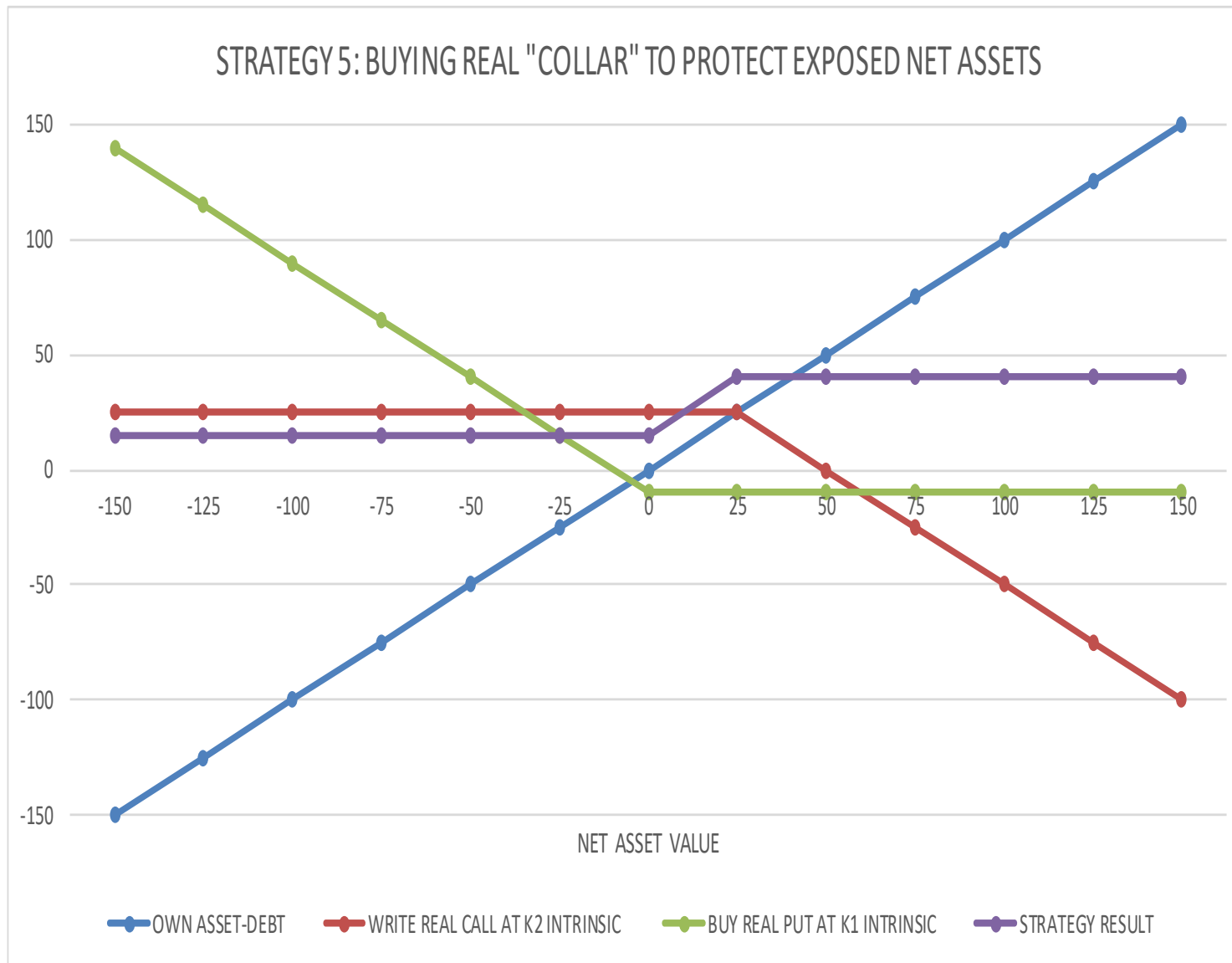


“Poor” Protective User Strategy

- 4. You are required or committed to use an asset subject to debt, and seek partial protection against increases in the price of that net asset.
- Write a real put option to sell that net asset at nil cost, if net asset currently worth 0, for an immediate payment of an option premium.
- Strategy result equals writing a real call on the net asset value.

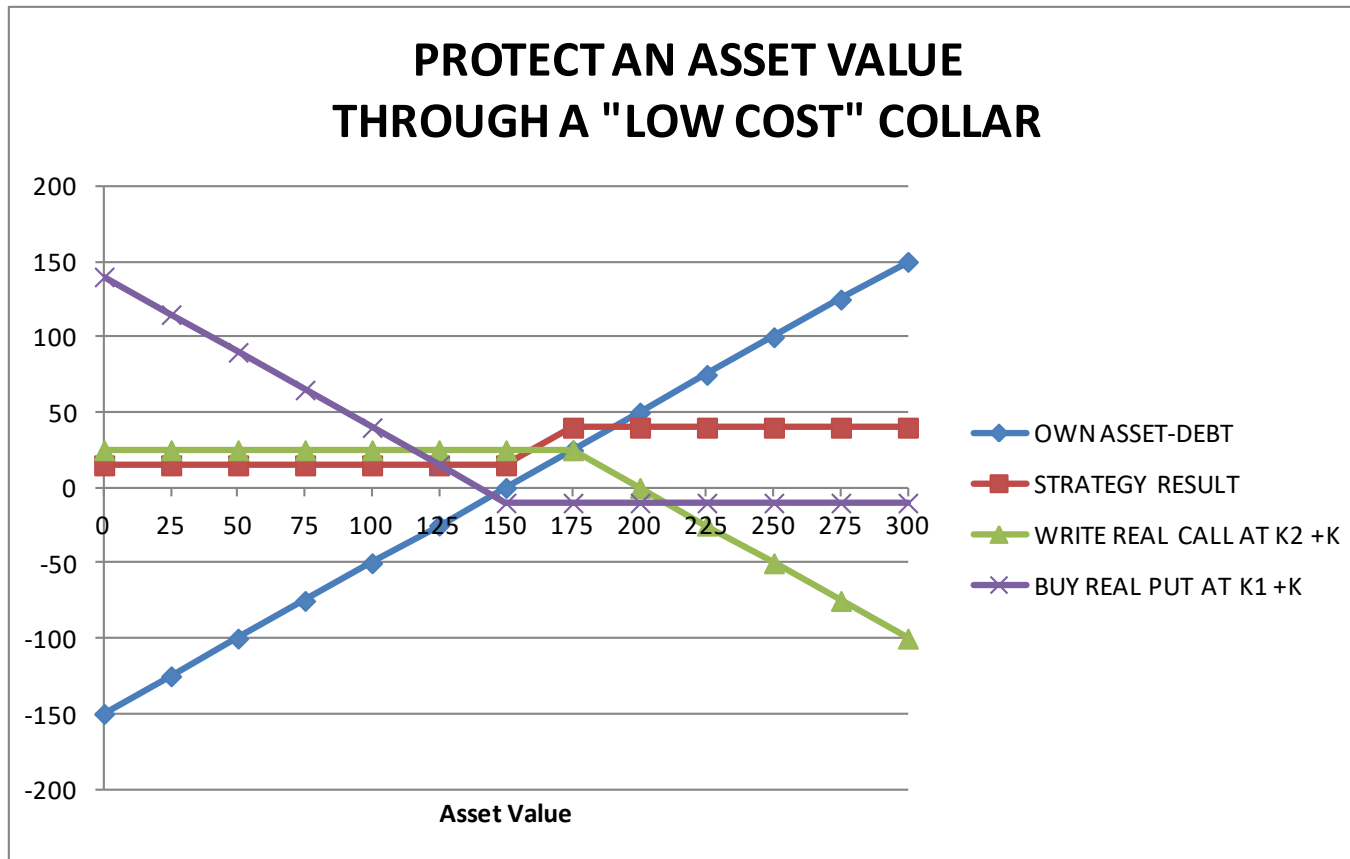
STRATEGY 4: REQUIRE USE OF A NET ASSET





	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	REAL OPTION PAYOFFS													
2	OWN ASSET-DEBT	-150	-125	-100	-75	-50	-25	0	25	50	75	100	125	150
3	WRITE REAL CALL AT K2 INTRINSIC	25	25	25	25	25	25	25	25	0	-25	-50	-75	-100
4	BUY REAL PUT AT K1 INTRINSIC	140	115	90	65	40	15	-10	-10	-10	-10	-10	-10	-10
5	STRATEGY RESULT	15	15	15	15	15	15	15	40	40	40	40	40	40
6	K2	25												
7	K1	0												
8	Debt, K	150												
9	Option cost, y2	25												
10	Option cost, y1	10												
11	Own asset subject to debt K, buy a "costless protective put" (=protective collar).													
12	STRATEGY RESULT equals real collar.													
13	WRITE REAL CALL AT K2 INTRINSIC	IF(B2>\$B\$6,\$B\$6-B2+\$B\$9,\$B\$9)												
14	BUY REAL PUT AT K1 INTRINSIC	IF(B2<\$B\$7,-B2-\$B\$7-\$B\$10,-\$B\$10)												
15	STRATEGY RESULT	B2+B3+B4												

PROTECT AN ASSET VALUE THROUGH A "LOW COST" COLLAR



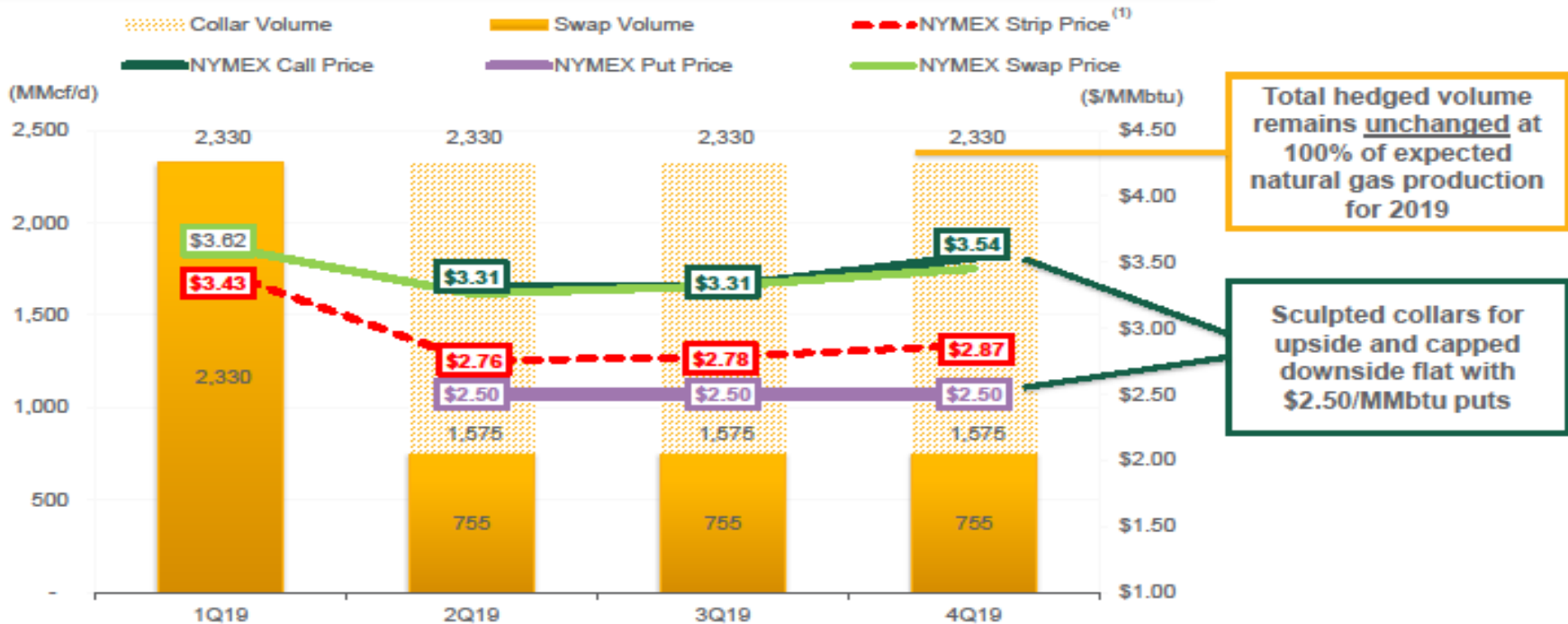
2019 Hedge Restructuring



Antero monetized 1.575 Bcf/d of swaps generating approximately \$235 MM in proceeds

- April – December 2019 swaps monetized at attractive NYMEX levels and replaced with collars
- Puts protect downside at \$2.50/MMBtu and calls offset “put” costs while opening up the upside between current strip and call ceiling ranging from \$3.31/MMBtu to \$3.54/MMBtu
- 2019 hedge position anchored with 2.33 Bcf/d hedged at \$3.62/MMBtu in 1Q 2019
- Proceeds utilized for accelerated delevering

Antero 2019 Natural Gas Hedge Profile



Total hedged volume remains unchanged at 100% of expected natural gas production for 2019

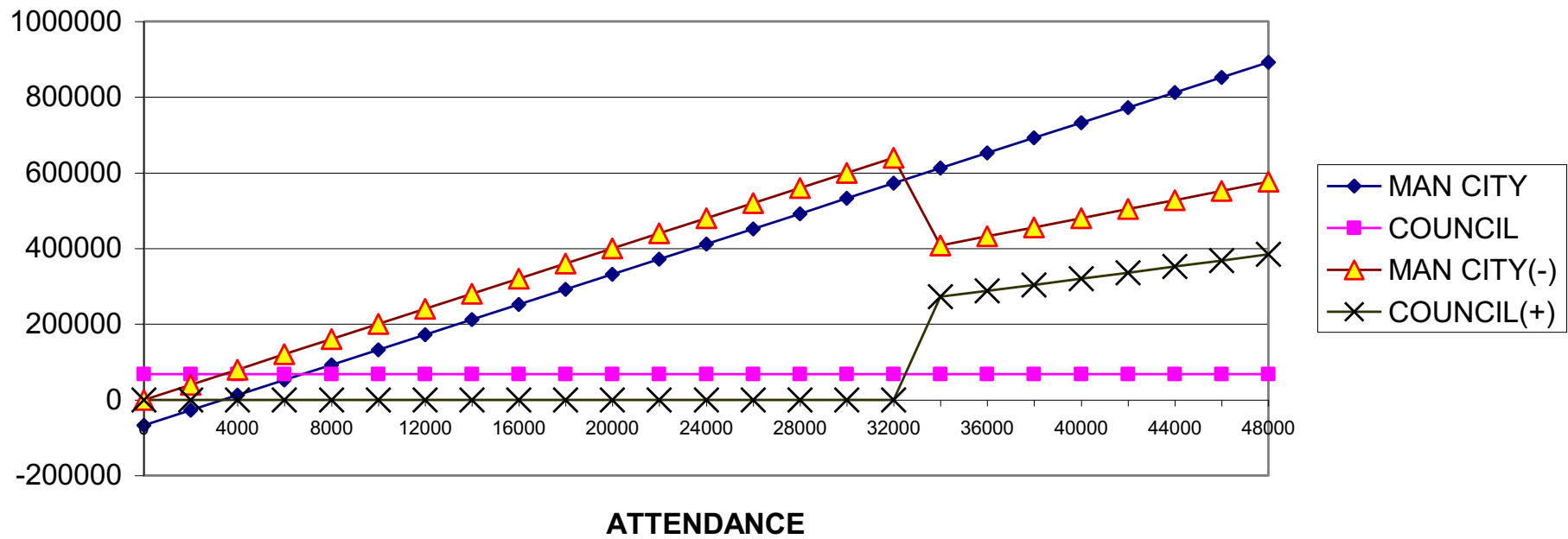
Sculpted collars for upside and capped downside flat with \$2.50/MMBtu puts

(1) NYMEX strip as of 12/17/2018.

REAL OPTION PAYOFFS

- MANCITY LEASES STADIUM FROM COUNCIL
- PAYS FIXED RENT or
- PAYS £0 RENT + % GATE RECEIPTS OVER 34000

MANCITY & COUNCIL SHARING ARRANGEMENT



Basic Analysis of Values

AR 12/2017	ASSETS	LIAB	
CURRENT	833	762	
UNPROVEN	2266	4800	LTD
PD PV10	6239	771	OL +MI
PUD PV10	3933		
GATHERING & Water	2,599		
OTHER ASSETS	1,249		
TOTAL PV10 BASIS	17,119	10,786	NA
SHARES	317	\$34.03	

STRATEGY

	STRATEGIC ACTIONS				
	BUY	SELL	VALUE + ROV	PRICE	VALUE+/PRICE
UN					
PD					
PUD					
PIPES					
FUTURES					
DEBT					
EQUITY					
M&A					
(PUD)					
DRILL					
HOLD					
DROP					
	OPERATING ACTIONS				
VARIABLE COSTS					
FIXED COSTS					
INVEST COSTS					
PRODUCTION					

Class Exercise One

EXERCISE 3.2. Illustrate (over a range of asset values from 0 to \$300) the payoff of owning an asset currently worth \$150 subject to debt of \$150, where the owner has bought the right to sell the net asset at \$0 for an immediate payment of an option premium of \$75.