

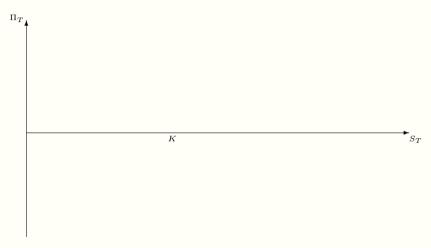
If we combine options and the underlying asset, we are able to derive different payoff profiles

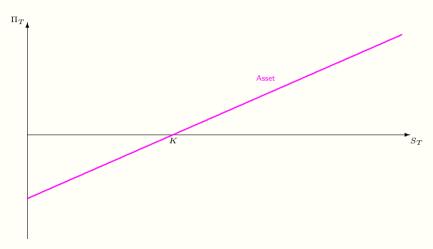
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- ► Hedging a long position in the underlying asset with a long put option gives us the payoff of a call option at maturity

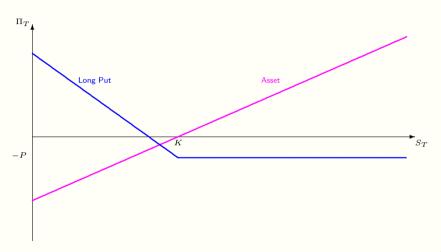
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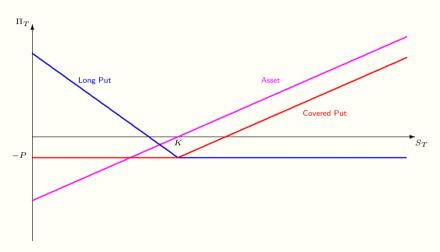
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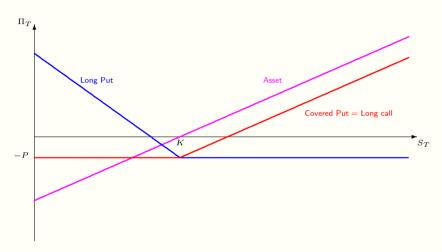


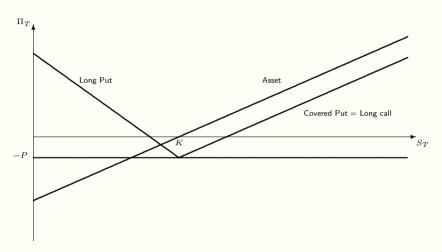












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Portfolio A			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \geq K$	

Portfolio B			
Initial investment	Payoff at maturity $S_T < K \mid S_T \geq K$		
	$S_T < K$	$S_T \geq K$	

Portfolio A			
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$		
	$S_T < K$	$S_T \ge K$	
S			
P			

Portfolio B			
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$		
	$S_T < K$	$S_T \geq K$	
C			
$Ke^{-rT}$			

Portfolio A		
Initial investment	Payoff at maturity	
	$S_T < K$	$S_T \ge K$
S	$S_T$	
P		

Portfolio B			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \ge K$	
C			
$Ke^{-rT}$			

Portfolio A			
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$		
	$S_T < K$	$S_T \ge K$	
$\overline{}$	$S_T$	$S_T$	
P			

Portfolio B			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \geq K$	
$\overline{C}$			
$Ke^{-rT}$			

Portfolio A		
Initial investment	Payoff at maturity	
	$S_T < K$	$S_T \ge K$
S	$S_T$	$S_T$
P	$K - S_T$	

Portfolio B			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \geq K$	
C			
$Ke^{-rT}$			

Portfolio A			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \ge K$	
$\overline{S}$	$S_T$	$S_T$	
P	$K - S_T$	0	

Portfolio B			
Initial investment	Payoff at maturity		
	$S_T < K$	$S_T \geq K$	
C			
$Ke^{-rT}$			

Portfolio A			
Initial investment	Payoff at maturity		
	$S_T < K \mid S_T \ge K$		
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P	$K - S_T$	0	
	K		

Portfolio B			
Initial investment	Payoff at maturity		
	$S_T < K \mid S_T \ge K$		
$\overline{}$			
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Portfolio A		
Payoff at maturity		
$S_T < K \mid S_T \ge K$		
$S_T$	$S_T$	
$K - S_T$	0	
K	$S_T$	
	Payoff at $S_T < K$	

Portfolio B			
Initial investment	Payoff at maturity		
	Payoff at maturity $S_T < K \mid S_T \ge K$		
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$Ke^{-rT}$			

Portfolio A			
Payoff at maturity			
$S_T < K$	$S_T \ge K$		
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$S_T$	$S_T$		
$K - S_T$	0		
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	Payoff at $S_T < K$		

Portfolio B			
Initial investment	Payoff at maturity		
	Payoff at maturity $S_T < K \mid S_T \ge K$		
C	0	$S_T - K$	
$Ke^{-rT}$			

Portfolio A			
Initial investment	Payoff at maturity		
	Payoff at maturity $S_T < K \mid S_T \ge K$		
S	$S_T$	$S_T$	
P	$K - S_T$	0	
	K	$S_T$	

Portfolio B			
Initial investment	Payoff at maturity		
	Payoff at maturity $S_T < K \mid S_T \ge K$		
C	0	$S_T - K$	
$Ke^{-rT}$	K		

Portfolio A			
Payoff at maturity			
$S_T < K$	$S_T \ge K$		
$S_T$	$S_T$		
$K - S_T$	0		
K	$S_T$		
	Payoff at $S_T < K$		

Portfolio B			
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$		
	$S_T < K$	$S_T \geq K$	
C	0	$S_T - K$	
$Ke^{-rT}$	K	K	

Portfolio A		
Payoff at maturity		
$S_T < K$	$S_T \ge K$	
$S_T$	$S_T$	
$K - S_T$	0	
K	$S_T$	
	Payoff at $S_T < K$	

Portfolio B		
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$	
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Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$	
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## Comparing portfolio payoffs

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	K	$S_T$		

Portfolio B				
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$			
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Portfolio B				
Initial investment	Payoff at maturity $S_T < K \mid S_T \ge K$			
	$S_T < K$	$S_T \ge K$		
C	0	$S_T - K$		
$Ke^{-rT}$	K	K		
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► If the strike price is equal to the current price of the underlying (at-the-money), put options are worth less than call options

- lacktriangle Assume that the strike price is equal to the current price: K=S
- $\Rightarrow P = C (1 e^{-rT}) K < C$
- If the strike price is equal to the current price of the underlying (at-the-money), put options are worth less than call options
- Profits from put options are limited to the value of the underlying asset

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