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GFX Option Strategies

Product Library

Definitions
Descriptions
Graphical Representations
Examples
Advantages/Disadvantages

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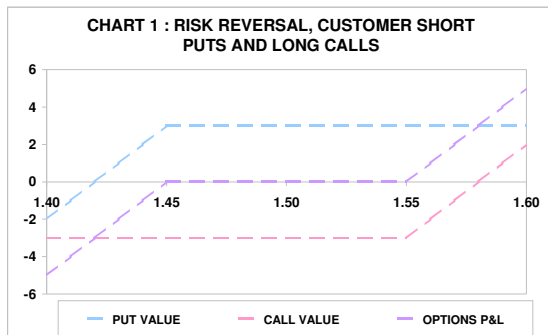
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Risk Reversal (Collar/Tunnel Combo)

A risk reversal is the combination of buying a call and selling a put for different strikes with the same expiry date. This provides the customer with a future spot rate hedge to their initial currency position whereby they cap the rate at a ceiling and floor the rate at a minimum level. The strikes of a risk reversal are often set so that the initial contract is entered for zero cost

Example 1: Customer has a Short GBP100mio Position



Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters a 6 month 1.45 / 1.55 risk reversal in GBP100mio for zero cost, buying the GBP call.

Customer buys GBP 100mio 1.55 GBP Call USD Put with a 6 months expiry at a premium of 30 cents per GBP and sells GBP 100mio 1.45 GBP Put USD Call with a 6 months expiry at a premium of 30 cents per GBP.

Customer pays nil today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

The 1.45 GBP Put is exercised obliging the customer to buy GBP 100mio at 1.45. The 1.55 GBP Call expires out of the money and is not exercised.

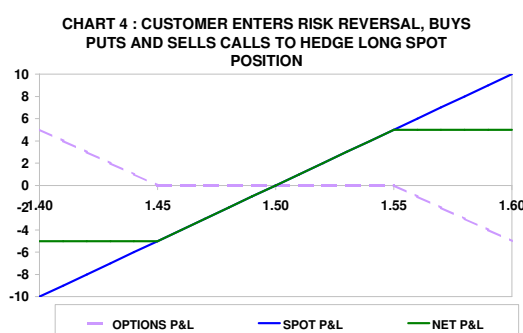
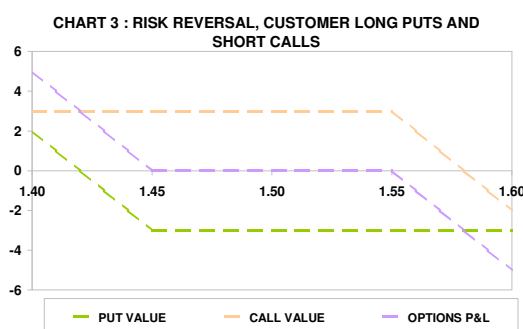
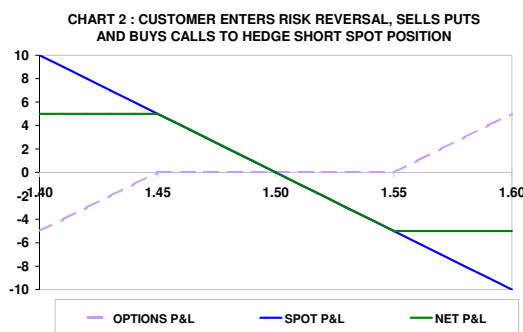
$1.45 < S_0 < 1.55$

Both the 1.45 GBP Put and the 1.55 GBP Call expire out of the money and are not exercised. The customer buys the GBP 100mio for S_0 in the market.

$S_0 > 1.55$

The customer exercises the 1.55 GBP Call buying 100mio GBP at 1.55. The 1.45 GBP Put expires out of the money and is not exercised.

Overall, the customer has ensured that they will always pay $1.45 < S_0 < 1.55$ for their GBP 100mio



Example 2: Customer has a Long GBP100mio Position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters a 6 month 1.45 / 1.55 risk reversal in GBP100mio for zero cost, selling the GBP call.

Customer sells GBP 100mio 1.55 GBP Call USD Put with a 6 months expiry at a premium of 30 cents per GBP and buys GBP 100mio 1.45 GBP Put USD Call with a 6 months expiry at a premium of 30 cents per GBP.

Customer pays nil today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

The customer exercises the 1.45 GBP Put, selling GBP 100mio for 1.45. The 1.55 GBP Call expires out of the money and is not exercised.

$1.45 < S_0 < 1.55$

Both the 1.45 GBP Put and the 1.55 GBP Call expire out of the money and are not exercised. The customer sells the GBP 100mio for S_0 in the market.

$S_0 > 1.55$

The 1.55 GBP Call is exercised obliging the customer to sell

100mio GBP at 1.55. The 1.45 GBP Put expires out of the money and is not exercised.

Overall, the customer has ensured that they will always pay $1.45 < S_0 < 1.55$ for their GBP 100mio

■ **Advantages:**

- 1) Provides protection against large currency movements.
- 2) Enables customer to take advantage of small currency movements.
- 3) No upfront costs
- 4) Customer has guaranteed base rate.
- 5) Can be tailored to match customer's views and needs
- 6) Liquid, can be reversed at any time.
- 7) Enables customers or option traders to take positions connecting spot and volatility behaviour. The customer will gain from higher implied volatility if spot moves towards the option he is long, and will lose from higher implied volatility if spot moves towards the option he is short.

■ **Disadvantages:**

- 1) Cannot take advantage of large spot rate movements in customer's favour

Seagull

A seagull is the combination of three options for the same expiry date. This provides the customer with insurance for the first part of any move. The strikes are often set so that the initial contract is entered for zero cost

Example 1: Customer has a Short GBP100mio Position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters a 6 month seagull in GBP100mio for zero cost.

Customer buys 1.50 GBP Call USD Put and sells 1.57 GBP Call USD Put. Customer also sells 1.43 GBP Put USD Call.

Customer pays nil today.

At expiry, GBP/USD spot rate (S_0):

- $S_0 < 1.43$ The 1.43 GBP Put is exercised obliging the customer to buy GBP 100mio at 1.43. The 1.50 GBP Call and the 1.57 GBP Call expire out of the money and are not exercised.
- $1.43 < S_0 < 1.50$ All three options expire out of the money and are not exercised. The customer buys the GBP 100mio for S_0 in the market.
- $1.50 < S_0 < 1.57$ The customer exercises the 1.50 GBP Call buying 100mio GBP at 1.50. Both the 1.43 GBP Put and the 1.57 GBP Call expire out of the money and are not exercised.
- $S_0 > 1.57$ Both the 1.50 GBP Call and the 1.57 GBP Call are exercised, so that the customer receives a USD 0.07 payout = USD7mio. However, the customer will need to buy the GBP 100mio for S_0 in the market. The 1.43 GBP Put expires out of the money and is not exercised.

Overall, the customer has protection for the first part of a move upwards from 1.50. He pays no premium up front for that protection, and can still benefit from a move downwards. However, he gives up any further benefit below 1.43, and he is unhedged for a move against him beyond 1.57.

Example 2: Customer has a Long GBP100mio Position

Consider Cable (GBP/USD), spot rate at 1.50.

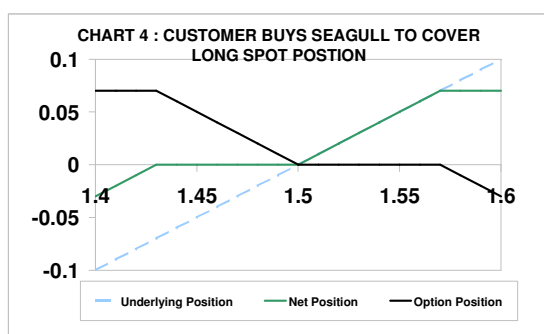
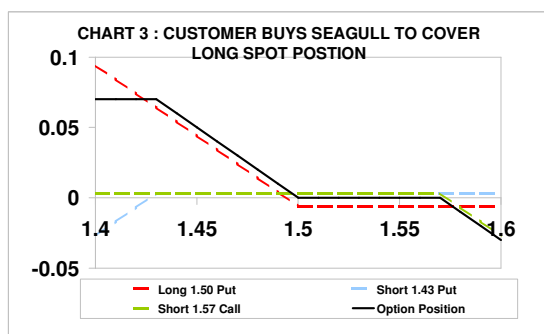
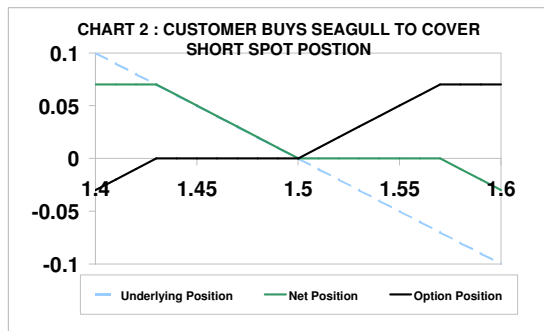
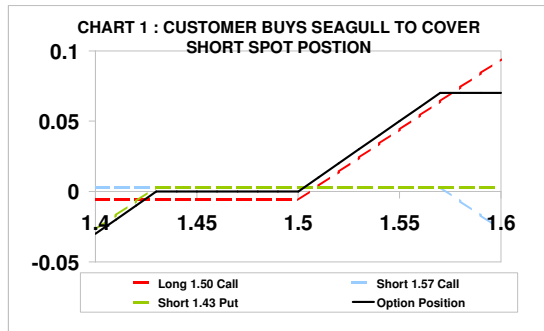
Customer enters a 6 month seagull in GBP100mio for zero cost.

Customer buys 1.50 GBP Put USD Call and sells 1.43 GBP Put USD Call. Customer also sells 1.57 GBP Call USD Put.

Customer pays nil today.

At expiry, GBP/USD spot rate (S_0):

- $S_0 < 1.43$ Both the 1.50 GBP Put and the 1.43 GBP Put are exercised, so that the customer receives a USD 0.07 payout = USD7mio. However, the customer will need to sell the GBP 100mio for S_0 in the market. The 1.57 GBP Call expires out of the money and is not exercised.
- $1.43 < S_0 < 1.50$ The customer exercises the 1.50 GBP Put selling 100mio



	GBP at 1.50. Both the 1.43 GBP Put and the 1.57 GBP Call expire out the money and are not exercised.
$1.50 < S_0 < 1.57$	All three options expire out the money and are not exercised. The customer sells the GBP 100mio for S_0 in the market.
$S_0 > 1.57$	The 1.57 GBP Call is exercised obliging the customer to sell GBP 100mio at 1.57. The 1.50 GBP Put and the 1.43 GBP Put expire out of the money and are not exercised.

Overall, the customer has protection for the first part of a move downwards from 1.50. He pays no premium up front for that protection, and so can benefit from a move upwards. However, he gives up any further benefit above 1.57, and he is unhedged for a move against him beyond 1.43.

■ Advantages:

- 1) Enables customer to take advantage of small currency movements.
- 2) No upfront costs
- 3) The customer will typically sell implied volatility in such a structure. They will benefit from small moves, but will be worse off for large moves.
- 4) A naked seagull is a good way of taking advantage of the yield differential between two currencies. For example, consider the cuase in GBP/JPY where GBP yields about 5% and JPY yields about 0%. If the spot rate is about 190, the 1 year forward rate is about 180. A customer may be able to buy a 180 GBP Call JPY Put, sell a 190 GBP Call JPY Put and sell a 170 GBP Put JPY Call for zero cost. The customer will make 5% if spot is at or above this level in a year's time. His only liability occurs if spot weakens by more than 10%, in which case he loses money if it weakens further.

■ Disadvantages:

- 1) The customer still has unlimited downside.

Reverse Seagull

A reverse seagull is the combination of three options for the same expiry date. This provides the customer with insurance for any large move. The strikes are often set so that the initial contract is entered for zero cost

Example 1: Customer has a Short GBP100mio Position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters a 6 month seagull in GBP100mio for zero cost.

Customer sells a 1.50 GBP Put USD Call and buys a 1.43 GBP Put USD Call. Customer also buys a 1.57 GBP Call USD Put.

Customer pays nil today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.43$

Both the 1.50 GBP Put and the 1.43 GBP Put are exercised, so that the customer does not benefit from the spot move from 1.50 to 1.43. However, the customer will maintain their short spot position and benefit from a move below 1.43. The 1.57 GBP Call expires out the money and is not exercised.

$1.43 < S_0 < 1.50$

The 1.50 GBP Put is exercised obliging the customer to buy 100mio GBP at 1.50. Both the 1.43 GBP Put and the 1.57 GBP Call expire out the money and are not exercised.

$1.50 < S_0 < 1.57$

All three options expire out the money and are not exercised. The customer buys the GBP 100mio for S_0 in the market.

$S_0 > 1.57$

The customer exercises the 1.57 GBP Call, buying GBP 100mio at 1.57. The 1.50 GBP Put and the 1.43 GBP Put expire out of the money and are not exercised.

Overall, the customer has protection in a move up beyond 1.57. He pays no premium up front for that protection, and can still benefit from a move downwards beyond 1.43. However, he gives up any benefit between 1.50 and 1.43, and he is unhedged for a move against him from 1.50 until 1.57.

Example 2: Customer has a Long GBP100mio Position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters a 6 month seagull in GBP100mio for zero cost.

Customer sells a 1.50 GBP Call USD Put and buys a 1.57 GBP Call USD Put. Customer also buys a 1.43 GBP Put USD Call.

Customer pays nil today.

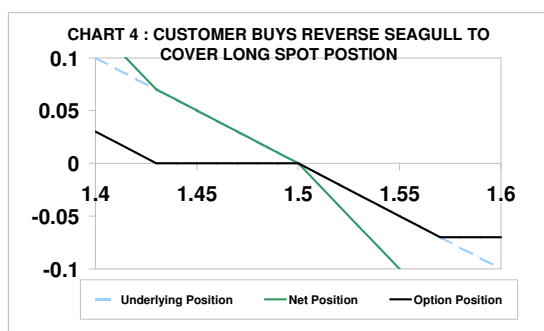
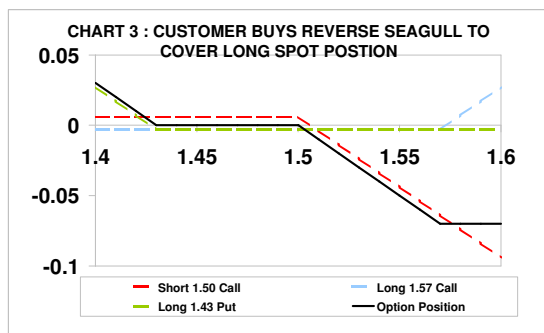
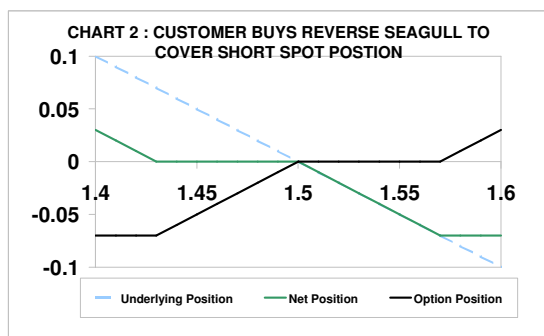
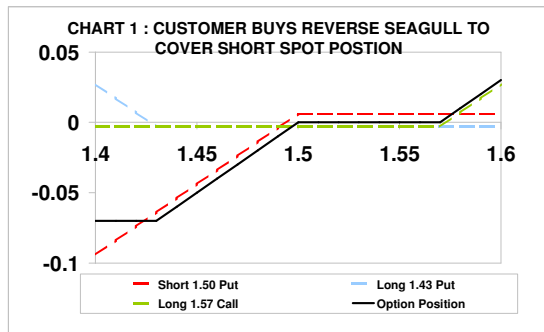
At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.43$

The customer exercises the 1.43 GBP Put, selling GBP 100mio at 1.43. The 1.50 GBP Call and the 1.57 GBP Call expire out of the money and are not exercised.

$1.43 < S_0 < 1.50$

All three options expire out the money and are not exercised.



	The customer sells the GBP 100mio for S_0 in the market.
$1.50 < S_0 < 1.57$	The 1.50 GBP Call is exercised obliging the customer to sell 100mio GBP at 1.50. Both the 1.43 GBP Put and the 1.57 GBP Call expire out the money and are not exercised.
$S_0 > 1.57$	Both the 1.50 GBP Call and the 1.57 GBP Call are exercised, so that the customer does not benefit from the spot move from 1.50 to 1.57. However, the customer will maintain their long spot position and benefit from a move above 1.57. The 1.43 GBP Put expires out the money and is not exercised.

Overall, the customer has protection in a move down beyond 1.43. He pays no premium up front for that protection, and can still benefit from a move upwards beyond 1.57. However, he gives up any benefit between 1.50 and 1.57, and he is unhedged for a move against him from 1.50 until 1.43.

■ **Advantages:**

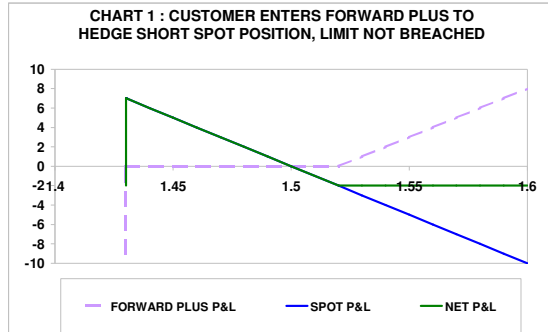
- 1) Protects customer from large currency movements.
- 2) The customer has limited downside.
- 3) No upfront costs
- 4) The customer will typically buy implied volatility in such a structure. They will benefit from large moves, but will be worse off for small moves.

■ **Disadvantages:**

- 1) The customer gives up some of his initial upside potential.

Forward Plus

In a forward plus contract, the customer enters a forward contract at a base rate slightly worse than a vanilla forward. However, unless the spot rate crosses a 'limit' rate during the life of the contract, at expiry the customer may, if they wish, cancel the forward and do a transaction in the market.



Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters 6 months forward plus to buy GBP, base rate 1.52, limit 1.43

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.43$

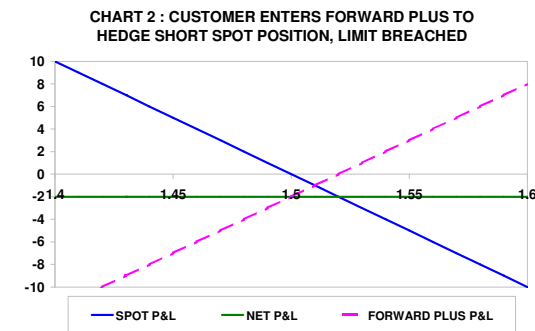
The limit is reached and the customer has to buy GBP at the base rate.

$1.43 < S_0 < 1.52$

The limit is not reached and the spot rate is cheaper than the base rate. The customer cancels the forward contract and buys spot in the market.

$S_0 > 1.52$

The limit is not reached and the spot rate is more expensive than the base rate. The customer exercises the contract buying GBP at the base rate.



Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters 6 months forward plus to sell GBP, base rate 1.48, limit 1.57

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.48$

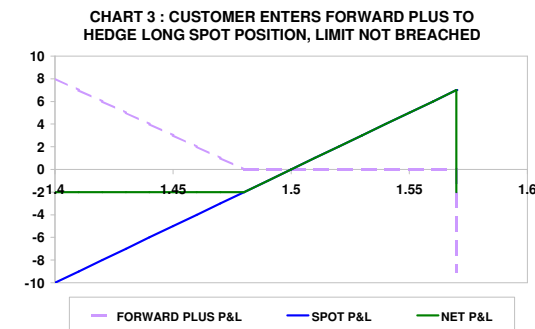
The limit is not reached and the spot rate is more expensive than the base rate. The customer exercises the contract selling GBP at the base rate.

$1.48 < S_0 < 1.57$

The limit is not reached and the spot rate is cheaper than the base rate. The customer cancels the forward contract and sells spot in the market.

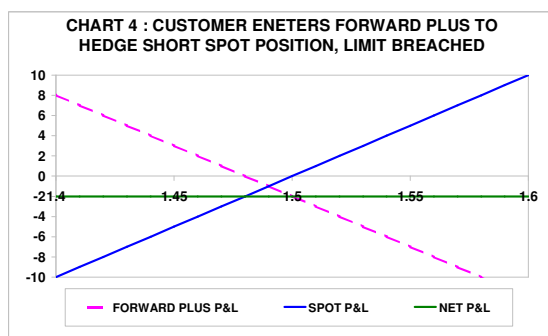
$S_0 > 1.57$

The limit is reached and the customer has to sell GBP at the base rate.



Advantages:

- 1) Customer benefits from a better rate than the vanilla forward provided rates move in their favour within the range.
- 2) Customer can take advantage of small spot moves in his favour, without being hurt by moves against him.
- 3) Customer has guaranteed base rate.
- 4) Can be tailored to match customer's views and needs
- 5) This structure leaves the customer slightly short implied volatility.



■ **Disadvantages:**

- 1) If there is a large spot rate move in customer's favour then they lose out with the rate resetting.
- 2) The customer pays a higher rate initially than the vanilla forward.

Forward Extra

In a forward extra contract, the customer enters a forward contract at a base rate worse than a vanilla forward. However, unless the spot rate crosses a 'limit' rate during the life of the contract, at expiry the customer may, if they wish, cancel the forward and do a transaction in the market. If the spot rate does cross the limit rate, they enter into a forward transaction at the forward rate that was available in the market on the day the forward extra contract was agreed.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer enters 6 months forward plus to buy GBP, base rate 1.53, limit 1.43.
Vanilla forward rate is 1.4900

Customer pays nil premium today.
At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.43$

The limit is reached and the customer has to buy GBP at 1.4900.

$1.43 < S_0 < 1.53$

The limit is not reached and the spot rate is cheaper than the base rate. The customer cancels the forward contract and buys spot in the market.

$S_0 > 1.53$

The limit is not reached and the spot rate is more expensive than the base rate. The customer exercises the contract buying GBP at the base rate of 1.5300.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer enters 6 months forward plus to sell GBP, base rate 1.47, limit 1.57, vanilla forward is 1.4900.

Customer pays nil premium today.
At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.47$

- The limit is not reached and the spot rate is more expensive than the base rate. The customer exercises the contract selling GBP at the base rate of 1.4700.

$1.47 < S_0 < 1.57$

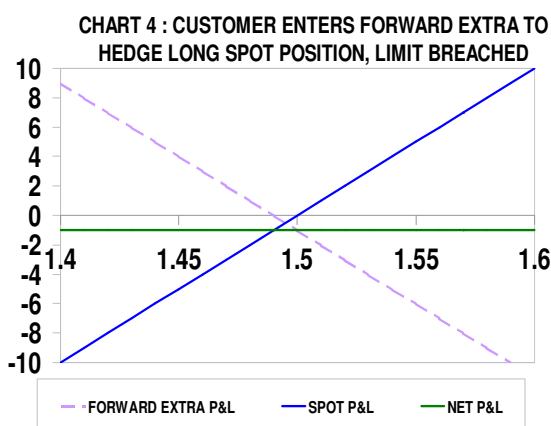
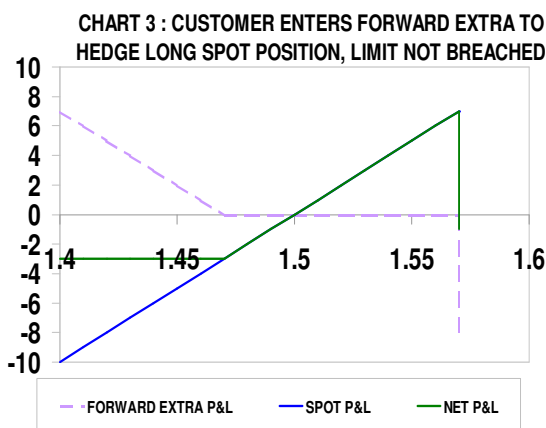
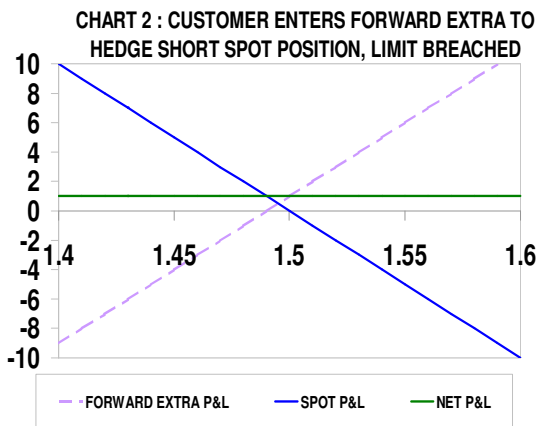
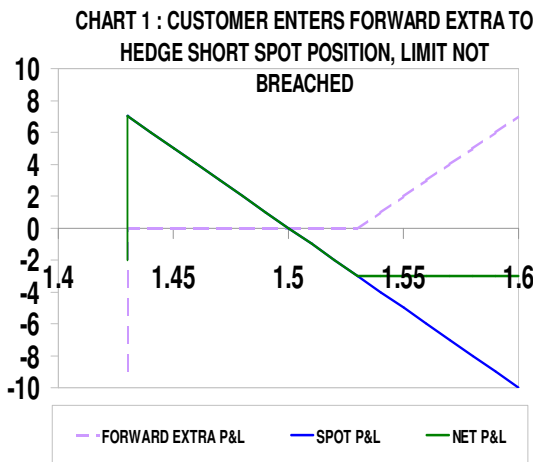
- The limit is not reached and the spot rate is cheaper than the base rate. The customer cancels the forward contract and sells spot in the market.

$S_0 > 1.57$

- The limit is reached and the customer has to sell GBP at 1.4900.

Advantages:

- 1) Customer benefits from a better rate than the vanilla forward provided rates move in their favour within the range.
- 2) Customer can take advantage of small spot moves in his favour, without being hurt by moves against him.
- 3) Customer has guaranteed base rate.
- 4) If limit trades, customer gets better forward rate than would do with forward plus.



- 5) Can be tailored to match customer's views and needs
- 6) This structure leaves the customer slightly short implied volatility.

■ **Disadvantages:**

- 1) If there is a large spot rate move in customer's favour then they lose out with the rate resetting.
- 2) The customer pays a higher rate initially than the vanilla forward or a forward plus.

Knock-out forward

A forward that knocks out if the spot rate trades at or beyond a predetermined level is called a knock-out forward.

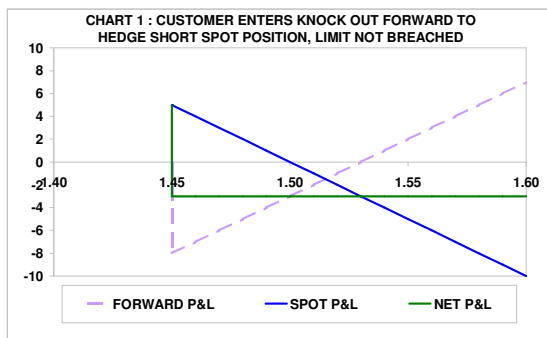
Typically this provides the customer with a hedge to their initial currency position but enables the customer to take advantage of rates that move in their favour by knocking-out the forward.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 1.53 GBP Forward with a knock-out at 1.45 with 6 months expiry for nil premium.

Customer pays nil premium today.

During the 6 months period, if the spot trades at or below 1.45, the 1.53 GBP Forward is knocked-out, enabling the customer to enter a new forward at a better rate. If the spot rate never reaches 1.45 over the life of the option, the forward will behave like a vanilla forward with similar payoffs.

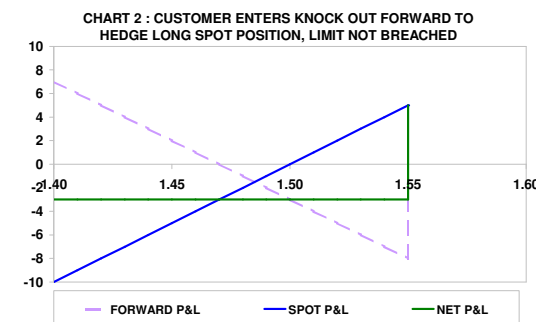


Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells GBP 100mio 1.47 GBP Forward with a knock-out at 1.55 with 6 months expiry for nil premium.

Customer pays nil premium today.

During the 6 months period, if the spot trades at or above 1.55, the 1.47 GBP Forward is knocked-out, enabling the customer to enter a new forward at a better rate. If the spot rate never reaches 1.55 over the life of the option, the forward will behave like a vanilla forward with similar payoffs.



Advantages:

- 1) Typically, customer reduces foreign exchange risk whilst still able to benefit from large movement in his favour.
- 2) Can be tailored to match customer's views and needs.
- 3) Liquid, can be reversed at any time.
- 4) If the knock-out forward contracts provides the customer with opportunity of improving on today's vanilla forward rate if the barrier trades, then the customer is buying volatility in the structure.
- 5) If the knock-out forward contract provides the customer with the opportunity of improving on today's vanilla forward rate unless the barrier trades, then the customer is selling volatility in the structure.

■ Disadvantages:

- 1) If the Forward knocks-out and the customer does not re-hedge, then the customer is unprotected against any subsequent move.
- 2) If the knock-out forward contract provides the customer with the opportunity of improving on today's vanilla forward rate if the barrier trades, then the initial rate is worse than the vanilla forward rate.
- 3) If the knock-out forward contract provides the customer with the opportunity of improving on today's vanilla forward rate unless the barrier trades, then if the barrier trades the customer may have to hedge at worse than the vanilla forward rate available today.

Knock-in forward

A forward that knocks in if the spot rate trades at or beyond a predetermined level is called a knock-in forward. Typically, this provides the customer with an unhedged initial currency position, allowing them to benefit from rates moving in their favour and providing protection if rates move against them by knocking-in the forward

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.52 GBP Forward with a knock-in at 1.55 with 6 months expiry and nil premium.

Customer pays nil premium today.

During the 6 months period, if the spot trades at or above 1.55 then the 1.52 Forward is knocked-in and the forward behaves like a vanilla forward. If the spot rate never reaches 1.55 over the life of the option, at expiry the customer will buy GBP 100mio at spot.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 100mio 1.48 GBP Forward with a knock-in at 1.45 with 6 months expiry for nil premium.

Customer pays no premium today.

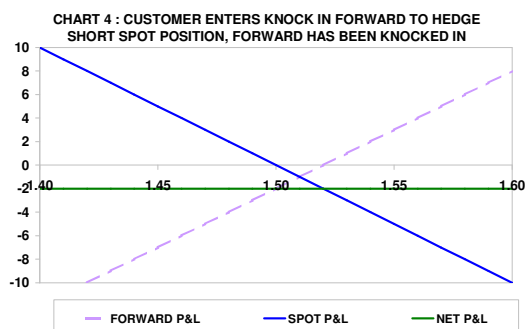
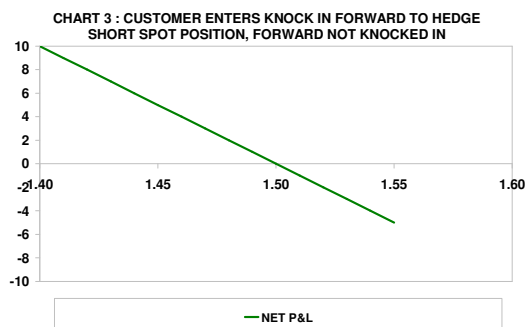
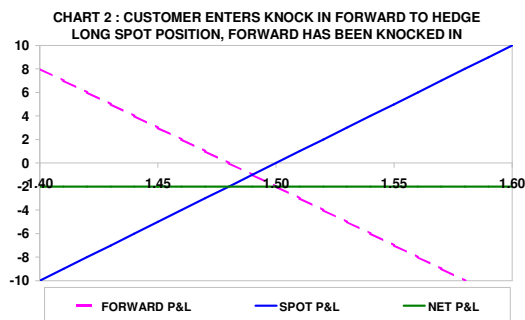
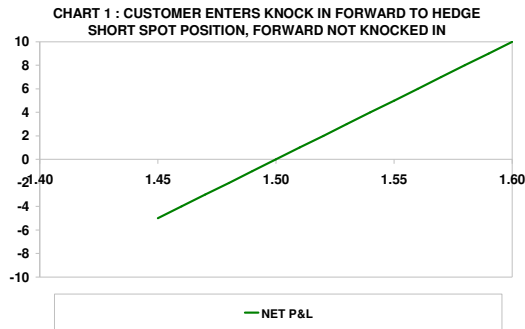
During the 6 months period, if the spot trades at or below 1.45 then the 1.48 GBP Forward is knocked-in and the forward behaves like a vanilla forward. If the spot rate never reaches 1.45 over the life of the option, at expiry the customer will sell GBP 100mio at spot.

Advantages:

- 1) Typically, the customer benefits from currency movements in their favour whilst being protected against large movements against them.
- 2) Can be tailored to match customer's views and needs
- 3) Liquid, can be reversed at any time.

Disadvantages:

- 1) Customer is not protected against small moves against them.
- 2) Once the forward knocks in, the customer is unable to take advantage of any moves in their favour.



Range forward

In a range forward contract, a customer enters a forward with a base rate slightly worse than a vanilla forward. However, if the spot rate trades within a range the forward rate improves to an improved rate.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 6 months Forward at a base rate of 1.53, with a 1.45 / 1.55 range resetting to an improved 1.46 at nil premium.

Customer pays nil premium today.

During the 6 months period, if the spot rate stays within the 1.45 / 1.55 range then the GBP Forward resets to the improved 1.46, and the customer buys GBP at 1.46. If however the spot rate trades outside the 1.45 / 1.55 range then the GBP Forward does not reset and the customer buys GBP at 1.53.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 100mio 6 months Forward at a base rate of 1.47, with a 1.45 / 1.55 range resetting to an improved 1.54 at nil premium.

Customer pays nil premium today.

During the 6 months period, if the spot rate stays within the 1.45 / 1.55 range then the GBP Forward resets to the improved 1.54, and the customer sells GBP at 1.54. If however the spot rate trades outside the 1.45 / 1.55 range then the GBP Forward does not reset and the customer sells GBP at 1.47.

Advantages:

- 1) Customer benefits from a lower rate than the vanilla forward provided rates stay within the range.
- 2) Enables customer to obtain a rate that may be better than any rate available in the market at any time during the life of the forward.
- 3) Provides customer with a guaranteed base rate.
- 4) If customer enters a range forward, with the possibility of a better rate if spot stays within a range, they are selling volatility.
- 5) Can also be structured to provide customer with a worse forward rate initially and an improvement if spot breaks a range. In such a case, the customer is buying volatility.
- 6) Can be tailored to match customer's views and needs

Disadvantages:

- 1) If there is a large spot rate move, the customer's rate worsens, regardless of whether the spot rate move was in the customer's favoured direction or not.

CHART 1 : CUSTOMER ENTERS RANGE FORWARD TO HEDGE SHORT SPOT POSITION, RANGE NOT BROKEN

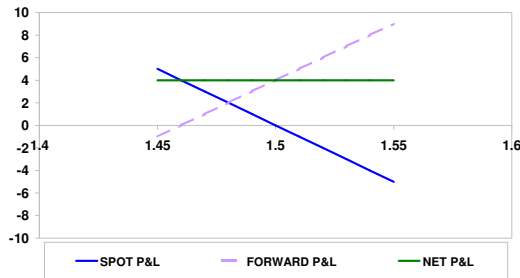


CHART 2 : CUSTOMER ENTERS RANGE FORWARD TO HEDGE SHORT SPOT POSITION IF RANGE BROKEN

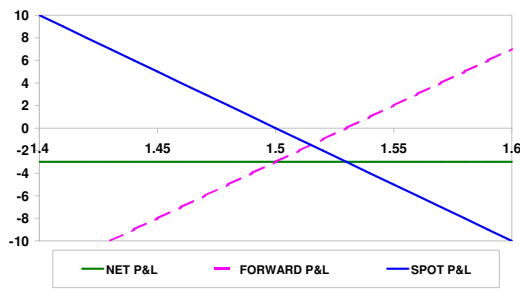


CHART 3 : CUSTOMER ENTERS RANGE FORWARD TO HEDGE LONG SPOT POSITION, RANGE NOT BROKEN

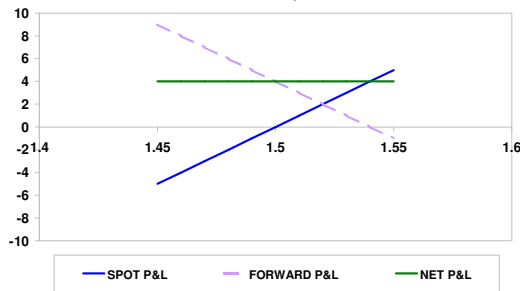
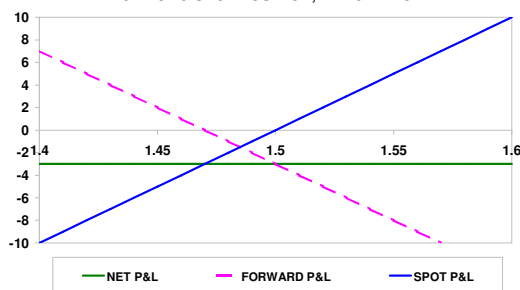


CHART 4 : CUSTOMER SHORT RANGE FORWARD TO HEDGE LONG SPOT POSITION, RANGE BROKEN



Accumulating forward

An accumulating forward allows the customer to reduce the size of the forward contract for every day that the spot rate is beyond a fixed level. In that event, the customer is able to hedge at a better rate than the existing forward rate, while limiting the worse case to the initial accumulating forward base rate.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.51 GBP Forward for 6 months. However, for each of the next 125 spot fixings based off 1FED, if the fixing is below 1.45 the notional principal is reduced by USD 800,000.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 25 of the fixings are below 1.45, then at expiry the customer is long $100/125 * \text{GBP } 100\text{mio}$ of the 1.51 Forward = GBP 80mio. If the customer wishes to have full GBP cover they will have to buy an additional GBP 20mio during the life of the contract. They are recommended to buy GBP 800,000 forward every day that spot fixes below 1.45.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 100mio 1.49 GBP Forward for 6 months. However, for each of the next 125 spot fixings based off 1FED, if the fixing is above 1.55 the notional principal is reduced by USD 800,000.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 25 of the fixings are above 1.55, then at expiry the customer is short $100/125 * \text{GBP } 100\text{mio}$ of the 1.49 Forward = GBP 80mio. If the customer wishes to have full GBP cover they will have to sell an additional GBP 20mio during the life of the contract. They are recommended to sell GBP 800,000 forward every day that spot fixes above 1.55.

■ Advantages:

- 1) Customer can benefit from rates in their favour by hedging at a better rate than the forward.
- 2) Contract depends on daily fixings, so it is unlikely to be affected significantly by short term shocks.
- 3) Rate will be based off public fixings, which assists ease of calculation.
- 4) Can be tailored to match customer's views and needs.
- 5) Contracts can be constructed to leave the customer long or short volatility. In the examples above, where the customer gets a slightly worse initial rate with the ability to hedge at a better rate for certain fixings, the customer is buying volatility.

The size of the principal of the forward will be determined by events during the life of the forward. However, the customer will always know the current principal and can do additional hedges accordingly if desired

■ Disadvantages:

- 1) If rates do not move sufficiently in the customer's favour then can be more expensive than a vanilla forward.
- 2) Does not provide customer with flexibility in changing amounts or dates unless trade is closed out and re-entered at a different rate.

Accumulating forward with double up

An accumulating forward with double allows the customer to reduce the size of the forward contract for every day that the spot rate exceeds a fixed level. However, the customer must increase the size of the forward contract for every day that the spot rate exceeds the base rate.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.45 GBP Forward for 6 months. However, for each of the next 125 spot fixings based off 1FED, if the fixing is above 1.53 the notional principal is reduced by GBP 800,000 and if the fixing is below 1.45 the notional principal is increased by GBP 800,000.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 25 of the fixings are below 1.45 and 40 of the fixings are above 1.53, then at expiry the customer is long $(125 + 25 - 40) / 125 * \text{GBP } 100\text{mio}$ of the 1.53 Forward = GBP 88mio. If the customer wishes to have full GBP cover they will have to buy GBP 12mio during the life of the contract. They are recommended to sell GBP 800,000 forward every day that spot fixes below 1.45 and buy GBP 800,000 forward every day that spot fixes above 1.53.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 100mio 1.47 GBP Forward for 6 months. However, for each of the next 125 spot fixings based off 1FED, if the fixing is above 1.55 the notional principal is reduced by GBP 800,000 and if the fixing is below 1.47 the notional principal is increased by GBP 800,000.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 25 of the fixings are above 1.55, and 40 of the fixings are below 1.47, then at expiry the customer is short $(125 - 25 + 40) / 125 * \text{GBP } 100\text{mio}$ of the 1.47 Forward = GBP 112mio. If the customer wishes to have full GBP cover they will have to buy GBP 12mio during the life of the contract. They are recommended to sell GBP 800,000 forward every day that spot fixes above 1.55 and buy USD 800,000 forward every day that spot fixes below 1.47.

■ Advantages:

- 1) Customer can benefit from rates in their favour by hedging at a better rate than the forward.
- 2) Contract depends on daily fixings, so it is unlikely to be affected significantly by short term shocks.
- 3) Rate will be based off public fixings, which assists ease of calculation.
- 4) Can be tailored to match customer's views and needs.
- 5) In example 1, the customer will get a substantially improved forward rate if spot stays close to present levels. He is selling implied volatility.
- 6) In example 2, the customer will get a substantially improved forward rate if spot moves away from present levels. He is buying implied volatility.

■ Disadvantages:

- 1) If rates do not move sufficiently in the customer's favour then can be more expensive than a vanilla forward.
- 2) Does not provide customer with flexibility in changing amounts or dates unless trade is closed out and re-entered at a different rate.
- 7) In example 1, the customer will get a substantially worse forward rate if spot moves away from present levels. He is selling implied volatility.
- 8) In example 2, the customer will get a substantially worse forward rate if spot stays close to present levels. He is buying implied volatility.

Improving forward

In an improving forward contract, the customer enters a forward contract at a base rate. Every day that the spot rate fixes beyond a reference rate, the base rate of the forward contract is improved.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys 6 months GBP Forward with a base rate of 1.53. For each of the next 125 spot fixings based off 1FED, if the fixing is below 1.52, the base rate reduces by 0.0005.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 35 of the fixings are below 1.52, then at expiry the customer has a vanilla forward contract at a rate of $(1.53 - .0005 * 35) = 1.5125$.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells 6 months GBP Forward with a base rate of 1.47. For each of the next 125 spot fixings based off 1FED, if the fixing is above 1.47, the base rate increases by 0.0005.

Customer pays nil premium today.

We observe the next 125 daily GBP/USD fixings. If, for example, 35 of the fixings are above 1.47, then at expiry the customer has a vanilla forward contract at a rate of $(1.47 + 0.0005 * 35) = 1.4875$.

■ Advantages:

- 1) Customer benefits from rate moves in their favour by improving their base rate.
- 2) Customer fully hedged at guaranteed base rate.
- 3) Contract depends on daily fixings, so it is unlikely to be affected significantly by short term shocks.
- 4) Rate will be based off public fixings, which assists ease of calculation.
- 5) Can be tailored to match customer's views and needs.
- 6) Depending on the level of the reference rate, the customer may be buying or selling volatility.

■ Disadvantages:

- 1) If rates do not move sufficiently in the customer's favour then can be more expensive than a vanilla forward.

The rate of the forward contract will depend upon market parameters during the life of the forward

Participating forward

In a participating forward contract, the customer enters a forward contract at a base rate worse than a vanilla forward but, at expiry, they get to participate in any improvements in the base rate according to a pre-agreed percentage.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys 6 months GBP 100mio Forward with a base rate of 1.5250 and 50% participation.

Customer pays nil premium today.

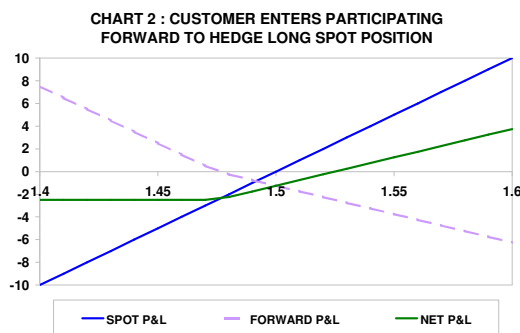
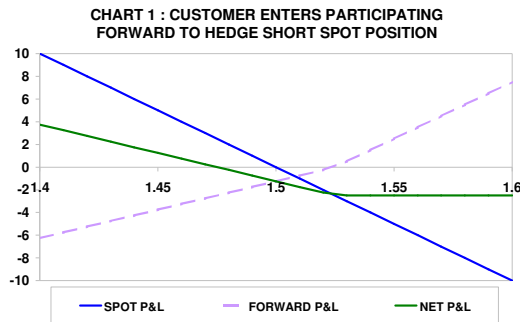
At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.5250$

Customer buys GBP 50mio at 1.5250 and can buy the balance in the market.

$S_0 > 1.5250$

The spot rate is above the base rate and therefore the customer buys the full GBP amount of GBP 100mio at 1.5250.



Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells 6 months GBP Forward with a base rate of 1.4750 and 50% participation.

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.4750$

The spot rate is below the base rate and therefore the customer sells the full GBP amount of GBP 100mio at 1.4750.

$S_0 > 1.4750$

Customer sells GBP 50mio at 1.4750 and can sell the balance in the market.

Advantages:

- 1) Customer fully protected at base rate.
- 2) Customer able to participate in rate moves in their favour.
- 3) Can be tailored to match customer's views and needs.
- 4) The customer is buying implied volatility in this contract.

Disadvantages:

- 1) If rates do not move sufficiently in the customer's favour then will be more expensive than a vanilla forward.
- 2) Customer does not have 100% participation in moves in their favour.

Hyper forward

In a hyper forward contract, the customer enters a forward contract at a base rate better than a vanilla forward but if, at expiry, the spot rate is beyond the base rate the customer must increase the size of the contract by a pre-agreed percentage.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 6 months GBP Forward with a base rate of 1.46, and doubles up below 1.46.

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.46$

The spot rate is below the base rate triggering the gearing, requiring the customer to buy GBP 200mio at 1.46.

$S_0 > 1.46$

The spot rate is above the base rate, therefore the gearing is not triggered and the customer buys GBP 100mio at 1.46.

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells 6 months GBP Forward with a base rate of 1.54, and doubles up above 1.54.

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.54$

The spot rate is below the base rate, therefore the gearing is not triggered and the customer sells GBP 100mio at 1.54.

$S_0 > 1.54$

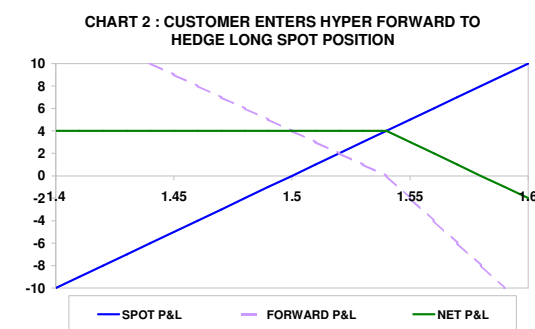
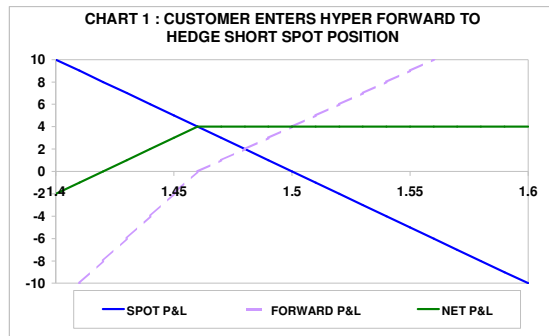
The spot rate is above the base rate triggering the gearing, requiring the customer to sell GBP 200mio at 1.54.

Advantages:

- 1) Customer benefits from a better base rate than the vanilla forward.
- 2) Customer may be able to hedge at a rate better than that seen in the market during the life of the forward.
- 3) Customer may be happy to be hedged at the base rate in a larger amount.
- 4) Can be tailored to match customer's views and needs.
- 5) The customer is selling implied volatility in this contract.

Disadvantages:

- 1) If rates move sufficiently against the customer, they may end up over-hedged and will need to unwind their additional position at a loss, or roll it forward.



Ratchet forward

A ratchet forward is a vanilla forward that has its strike reset when the spot rate reaches the ratchet trigger levels. This provides the customer with a hedge for their initial currency position and enables them to gain some benefit from spot rate moves in their favour.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 1.52 GBP Forward with 6 months expiry at nil premium, resetting to a 1.49 GBP Forward if the spot rate reaches 1.45, and to 1.46 if the spot rate reaches 1.40.

Customer pays nil premium today.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.40$

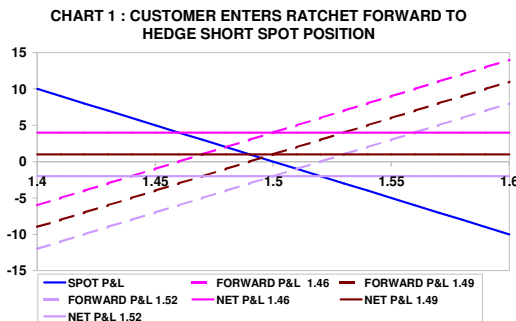
The strike rate on the GBP Forward is reset to 1.46 resulting in the customer buying GBP 100mio at 1.46 at expiry.

$1.40 < S_{\min} < 1.45$

The strike rate on the GBP Forward is reset to 1.49 resulting in the customer buying GBP 100mio at 1.49 at expiry.

$S_{\min} > 1.45$

The strike rate on the GBP Forward remains at 1.52 resulting in the customer buying GBP 100mio at 1.52 at expiry.



Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells GBP 100mio 1.48 GBP Forward with 6 months expiry at nil premium, resetting to a 1.51 GBP Forward if the spot rate reaches 1.55, and to 1.54 if the spot rate reaches 1.60.

Customer pays nil premium today.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.55$

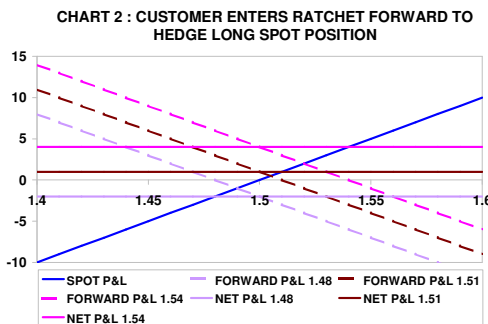
The strike rate on the GBP Forward remains at 1.48 resulting in the customer selling GBP 100mio at 1.48 at expiry.

$1.55 < S_{\min} < 1.60$

The strike rate on the GBP Forward is reset to 1.51 resulting in the customer selling GBP 100mio at 1.51 at expiry.

$S_{\min} > 1.60$

The strike rate on the GBP Forward is reset to 1.54 resulting in the customer selling GBP 100mio at 1.54 at expiry.



Advantages:

- 1) If the customer's strike rate improves as the levels are triggered, the customer benefits from currency movements in their favour whilst being protected against all movements against them.
- 2) Customer has guaranteed base rate.
- 3) Can be tailored to match customer's views and needs
- 4) If the customer's strike rate improves as the levels are triggered, the customer is buying implied volatility.
- 5) If the customer's strike rate worsens as the levels are triggered, the

customer is selling implied volatility.

■ **Disadvantages:**

- 1) Customer only partially shares in currency movements in their favour.
- 2) If the customer's strike rate improves as the levels are triggered, the initial rate is worse than a vanilla forward.
- 3) If the customer's strike rate worsens as the levels are triggered, the final possible rate is worse than a vanilla forward

Average rate forward

In an average rate forward contract, the customer enters a forward contract whose base rate is calculated at expiry, based on the average of the spot fixings during the contract period. This can be calculated as either a simple or weighted average.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 6 months GBP average rate Forward. Fixings are to be taken daily and based off 1FED with the average calculated on a simple basis.

Customer pays nil premium today.

If, for example, the average fixing during the 6 months is 1.49 then at expiry, the customer buys GBP 100mio at 1.49.

The customer will be able to lock in a rate relative to future spot fixings

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells GBP 100mio 6 months GBP average rate Forward at 0.01 below the average rate. Fixings are to be taken daily and based off 1FED with the average calculated on a simple basis.

Customer pays nil premium today.

If, for example, the average fixing during the 6 months is 1.51 then at expiry, the customer sells GBP 100mio at 1.50.

■ Advantages:

- 1) Customer benefits from rate moves in their favour.
- 2) Suits customer who has regular stream of income and wishes to match fixing rates as closely as possible.
- 3) Can be tailored to match customer's views and needs.
- 4) There is very little volatility in this contract.

■ Disadvantages:

- 1) Customer is exposed to currency rates moving against them.

Average rate forward with cap

In an average rate forward with cap contract, the customer enters a forward contract whose base rate is calculated upon expiry based on the average of the spot fixings during the contract period, subject to the rate being capped at a pre-agreed level. This can be calculated as either a simple or weighted average.

Example 1: Customer has a short GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 6 months Forward at the GBP average rate plus 0.005, capped at 1.53. Fixings are to be taken daily and based off 1FED with the average calculated on a simple basis.

Customer pays nil premium today.

At expiry, average GBP/USD spot rate (S_{av}):

$S_{av} < 1.5250$	$S_{av} + 0.005$ is below the cap and the customer buys GBP 100mio at $S_{av} + 0.005$.
$S_{av} > 1.5250$	$S_{av} + 0.005$ is above the cap and the customer buys GBP 100mio at 1.53

The customer will be able to lock in a rate relative to future spot fixings, and have insurance that his final rate will be no worse than the cap

Example 2: Customer has a long GBP 100mio position

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells GBP 100mio 6 months Forward at the GBP average rate less 0.02 capped at 1.47. Fixings are to be taken daily and based off 1FED with the average calculated on a simple basis.

Customer pays nil premium today.

At expiry, average GBP/USD spot rate (S_{av}):

$S_{av} < 1.49$	$S_{av} - 0.02$ is below the cap and the customer sells GBP 100mio at 1.47.
$S_{av} > 1.49$	$S_{av} - 0.02$ is above the cap and the customer sells GBP 100mio at $S_{av} - 0.02$.

■ Advantages:

- 1) Customer benefits from rate moves in their favour.
- 2) Customer has a cap to limit their exposure to adverse movements.
- 3) Suits customer who has regular stream of income and wishes to match rates as closely as possible.
- 4) Can be tailored to match customer's views and needs.
- 5) Customer is buying implied volatility in this contract.

■ Disadvantages:

- 1) Customer is exposed to rates moving against them up to the cap.
- 2) The guaranteed offset from the average forward rate will be a little worse for the customer than in the case of an average rate forward without cap.
- 3) Does not provide customer with flexibility in changing amounts or dates unless trade is closed out and re-entered at a different rate.

Cancelable forward

In a cancelable forward contract, two counterparties enter a forward contract for a series of exchanges at a fixed rate. One of the counterparties has the right to cancel the contract after a pre-agreed period of time.

Example 1: Customer has a short GBP 10mio position every month for 12 months

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 10mio per month 12 months GBP Forward at 1.53 with option to cancel each month after the sixth month.

Customer pays nil premium today.

For the first 6 months the customer buys GBP at 1.53.

In 7 months time the customer can agree to buy GBP 10mio or cancel that and all future payments. If the customer has not cancelled the contract in month 7 then they retain the option to do so in month 8 etc.

Example 2: Customer has a long GBP 10mio position every month for 12 months

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 10mio per month 12 months GBP Forward at 1.53 with Merrill Lynch having the option to cancel each month after the sixth month.

Customer pays nil premium today.

For the first 6 months the customer sells GBP at 1.53.

In 7 months time Merrill Lynch can choose to sell the customer GBP 10mio or to cancel that and all future payment. If Merrill Lynch has not cancelled the contract in month 7 then they retain the option to do so in month 8 etc.

The fact that one counterparty can cancel the remainder of the forward enables the other counterparty to achieve a much better rate in the meantime

■ Advantages:

- 1) If the customer has the right to cancel then they are fully hedged at the base rate and can benefit from a move in their favour
- 2) If ML has the right to cancel then the customer gets the base rate at a better rate than the vanilla forward.
- 3) Gives customer a degree of flexibility to cancel the contract should their monthly GBP flow change.
- 4) Can be tailored to match customer's views and needs.
- 5) If the customer has the right to cancel then they are buying implied volatility initially.
- 6) If ML has the right to cancel then the customer is selling implied volatility. initially

■ Disadvantages:

- 1) If the customer has the right to cancel then the base rate is worse than the vanilla forward rate
- 2) If ML has the right to cancel, then the customer may have to re hedge at a later date possibly at a worse rate

Extendable forward

In an extendable forward contract, two counterparties enter a forward contract for a series of exchanges at a fixed rate. After a pre-agreed period of time, one counterparty has the right to extend the contract for an additional pre-agreed period of time.

Example 1: Customer has a short GBP 10mio position every month for 12 months

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 10mio per month out to 6 months 1.53, with an option to extend for further 6 months.

Customer pays nil premium today.

For the first 6 months the customer buys GBP at 1.53.

In 7 months time, the customer can either extend the contract, agreeing to buy GBP 10mio per month for the next 6 months, or can choose to hedge separately.

The fact that one counterparty can extend the forward enables the other counterparty to achieve a much better rate in the meantime

Example 2: Customer has a long GBP 10mio position every month for 12 months

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 10mio per month 6 months GBP Forward at 1.53 with Merrill Lynch having the option to extend for further six month.

Customer pays nil premium today.

For the first 6 months the customer sells GBP at 1.53.

In 7 months time Merrill Lynch can choose to extend the contract for a further 6 months, forcing the customer to sell GBP 10mio per month for the next 6 months, or can choose to let the contract lapse.

■ Advantages:

- 1) If the customer has the right to extent then they benefit from rate moves in their favour and have flexibility to extend their contract should the monthly GBP flows continue.
- 2) If ML has the right to extend then the customer gets a better rate than the vanilla forward rate.
- 3) Can be tailored to match customer's views and needs.
- 7) If the customer has the right to extend then they are buying implied volatility initially.
- 4) If ML has the right to extend then the customer is selling implied volatility initially.

■ Disadvantages:

- 1) If the customer has the right to extend, the base rate is more expensive than the vanilla forward contract.
- 2) If ML has the right to extend then the customer may have to do more hedging later at an unfavourable rate.

Flexi forward

In a flexi forward contract, the customer enters a forward contract to exchange a fixed amount of currency by a fixed date. The exchange can take place on some or all of a number of fixed decision dates at the customer's discretion.

Example 1: Customer has a short GBP 100mio position over 12 months

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 12 months GBP Flexi Forward at 1.53 with monthly decision dates.

Customer pays nil premium today.
Customer may buy GBP 60mio after month 7 and GBP 30mio after month 11. In that case, they have to buy the remaining GBP 10mio at 1.53 after 12 months.

Example 2: Customer has a long GBP 100mio position over 12 months

Consider Cable (GBP/USD), spot rate at 1.50.
Customer sells GBP 100mio 12 months GBP Flexi Forward at 1.47.

Customer pays nil premium today.
Customer may sell GBP 30mio after month 4, GBP 45mio after month 8 and GBP 25mio after month 10. In that case, they have no remaining principal outstanding at expiry.

The fact that one counterparty can choose which dates to exercises the forward enables the other counterparty to achieve a slightly better rate overall

■ Advantages:

- 1) Customer gains a high degree of flexibility regarding the timing of the exchange.
- 2) Suitable for customers with cash flows of known amounts but uncertain timing.
- 3) Customer has guaranteed base rate.
- 4) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) The base rate is slightly more expensive than the vanilla forward contract.
- 2) The customer locks in a hedging rate and will not benefit from future movements

Delayed Premium

A delayed premium option is an option where the premium is not due to be paid until a date after the original purchase or sale has occurred. The premium can be paid up to the option exercise date. The premium has to be paid whether or not the option is exercised.

Example 1: Customer buys option with payment due on expiry

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio of a 1.55 GBP Call USD Put with 6 months expiry at a premium of 102 cents per GBP. The premium is to be paid on expiry. Option will cash settle with netting of premium.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.55$

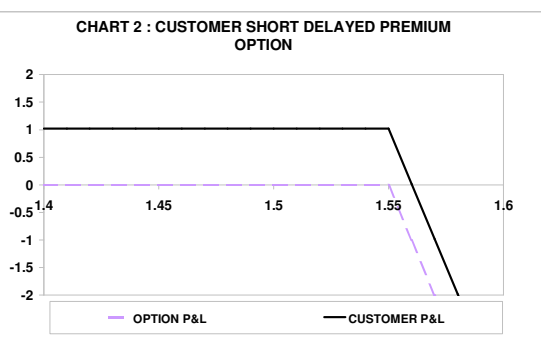
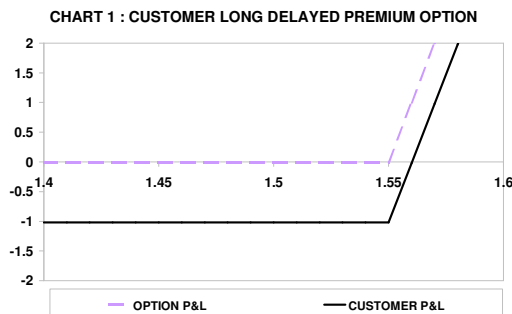
The GBP Call expires out of the money and is not exercised. The customer must pay the premium of USD 1,020,000.

$1.55 < S_0 < 1.5602$

The customer exercises the 1.55 GBP Call, buying GBP at 1.55, generating a payoff of USD $[(S_0 - 1.55) * 100\text{mio}]$. The customer nets off the premium, paying the balance.

$S_0 > 1.5602$

The customer exercises the 1.55 GBP Call, buying GBP at 1.55, generating a payoff of USD $[(S_0 - 1.55) * 100\text{mio}]$. The customer nets off the premium receiving the balance.



Example 2: Customer sells option with payment due on expiry

Consider Cable (GBP/USD), spot rate at 1.50

Customer sells GBP 100mio 1.55 GBP Call USD Put with 6 months expiry at a premium of 102 cents per GBP. Premium is to be paid on expiry. Option will cash settle with netting of premium.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.55$

The GBP Call expires out of the money and is not exercised. The customer receives the premium of USD 1,020,000.

$1.55 < S_0 < 1.5602$

The 1.55 GBP Call is exercised obliging the customer to sell GBP at 1.55, generating a payoff of USD $[(1.55 - S_0) * 100\text{mio}]$. The customer nets off the premium, receiving the balance.

$S_0 > 1.5602$

The 1.55 GBP Call is exercised obliging the customer to sell GBP at 1.55, generating a payoff of USD $[(1.55 - S_0) * 100\text{mio}]$. The customer nets off the premium paying the balance.

Advantages:

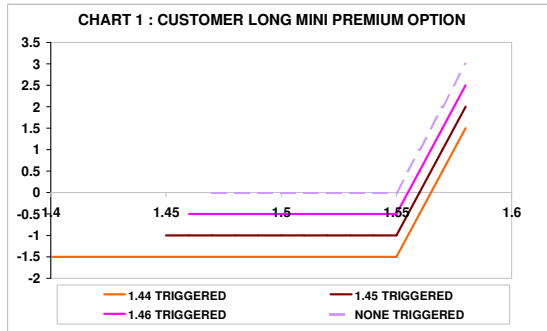
- 1) Buyer of option benefits from no initial cash outlay
- 2) Buyer of option premium which is delayed until expiry may be able to offset any gains from option position against premium spent.
- 3) May suit cash flows of buyer and seller.

Disadvantages:

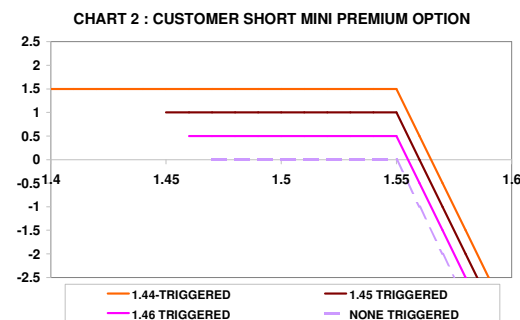
- 1) Seller of option does not receive any cash upfront.
- 2) Seller of option exposed to credit risk of option purchaser.

Mini Premium

A mini premium option has no premium due initially. Instead the premium is payable if predetermined trigger levels are reached. Should the trigger levels never be reached and the option expire, no premium will be payable for this option.



The option itself behaves like a vanilla call. The premium is independent of whether the option is exercised, and the option exercise is independent of any premium paid.



The option itself behaves like a vanilla call. The premium is independent of whether the option is exercised, and the option exercise is independent of any premium paid.

Example 1: Customer buys mini premium option

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.50 GBP Call USD Put with 6 months expiry at an initial nil premium. A premium of 70 cents per GBP is due if the spot rate reaches 1.46, a further 70 cents per GBP if the spot rate reaches 1.45, and a final 70 cents per GBP if the spot rate reaches 1.44.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.44$

All three trigger levels are reached and the customer must pay 210 cents per GBP.

$1.44 < S_{\min} < 1.45$

The 1.46 and 1.45 trigger levels are reached and the customer pays 140 cents per GBP.

$1.45 < S_{\min} < 1.46$

The 1.46 trigger level is reached and the customer pays 70 cents per GBP.

$S_{\min} > 1.46$

None of the trigger levels are reached and the customer pays no premium.

Example 2: Customer sells mini premium option

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 100mio 1.50 GBP Call USD Put with 6 months expiry at an initial nil premium. A premium of 70 cents per GBP is due if the spot rate reaches 1.46, a further 70 cents per GBP if the spot rate reaches 1.45, and a final 70 cents per GBP if the spot rate reaches 1.44.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.44$

All three trigger levels are reached and the customer receives 210 cents per GBP.

$1.44 < S_{\min} < 1.45$

The 1.46 and 1.45 trigger levels are reached and the customer receives 140 cents per GBP.

$1.45 < S_{\min} < 1.46$

The 1.46 trigger level is reached and the customer receives 70 cents per GBP.

$S_{\min} > 1.46$

None of the trigger levels are reached and the customer receives no premium.

Advantages:

- 1) Buyer of option benefits from no initial cash outlay
- 2) Buyer of option has the potential to pay no premium for the option if spot rates move in his preferred direction.
- 3) Seller of option receives a higher premium than for a vanilla option if rates reach all triggers.
- 4) The buyer of a mini-premium option will normally have a larger spot delta position than the buyer of the equivalent regular option.
- 5) The buyer of a mini-premium option will normally be slightly less long implied volatility than the buyer of the equivalent regular option.

■ Disadvantages:

- 1) Seller of option does not receive any cash upfront
- 2) Seller of option exposed to credit risk of option purchaser
- 3) Buyer of option pays a higher premium than for a vanilla option if rates reach all triggers.

Call Spreads and Put Spreads

A call spread is the combination of buying a call with a low strike and selling a call with a higher strike for the same expiry date. This is also known as a Bull spread.

A put spread is the combination of buying a put with a high strike and selling a put with a lower strike and the same expiry date. This is also known as a Bear spread.

Example 1: Customer buys a GBP call spread

Consider Cable (GBP/USD), spot rate at 1.50.

The customer buys GBP100mio of a 6 month 1.50 / 1.55 GBP Call Spread for a premium of 60 cents per GBP.

The components parts are as follows: The customer buys GBP 100mio of a 1.50 GBP Call USD Put with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 100mio of a 1.55 GBP Call USD Put with 6 months expiry at a premium of 40 cents per GBP.

Customer pays USD 600,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$

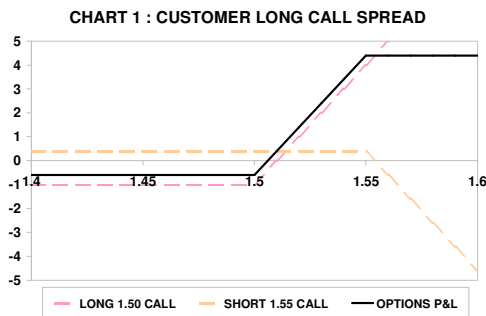
Both GBP Calls will expire out of the money and will not be exercised.

$1.50 < S_0 < 1.55$

The customer will exercise the 1.50 GBP Call, buying GBP at 1.50. The 1.55 GBP Call will remain out of the money and is not exercised.

$S_0 > 1.55$

The customer exercises the 1.50 GBP Call, buying GBP at 1.50, the 1.55 will also be exercised obliging the customer to sell GBP at 1.55, realising a USD 0.05 payoff, i.e. USD 5mio for a total profit of USD 4.4mio.



Example 2: Customer buys a GBP put spread

Consider Cable (GBP/USD), spot rate at 1.50

The customer buys GBP100mio of a 6 month 1.50 / 1.45 GBP Put spread for a premium of 60 cents per GBP.

The component parts are as follows: The customer buys GBP 100mio of a 1.50 GBP Put USD Call with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 100mio of a 1.45 GBP Put USD Call with a 6 months expiry at a premium of 40 cents per GBP.

Customer pays USD 600,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

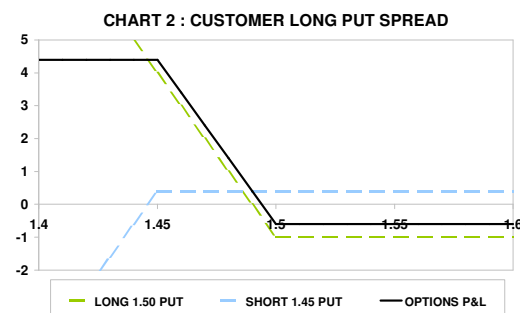
Both GBP Puts are exercised, the customer selling GBP at 1.50 and being obliged to buy GBP at 1.45, realising a USD 0.05 payoff, i.e. USD 5mio for a total profit of USD 4.4mio.

$1.45 < S_0 < 1.50$

The customer will exercise the 1.50 GBP Put, selling GBP at 1.50. The 1.45 GBP Put will remain out of the money and is not exercised.

$S_0 > 1.50$

Both GBP Puts will expire out of the money and will not be exercised.



Advantages:

- 1) The cap part of the spread reduces the initial premium compared to a single vanilla option, enabling the customer to get better leverage within the spread region.
- 2) Even if the spot trades beyond the cap, the customer can receive the full value of the cap. With reverse knock-out options, if spot trades above the barrier level the customer receives nothing.
- 3) If a customer buys a call spread or a put spread, the customer buys implied volatility. The customer is buying less implied volatility than if he just bought the first vanilla option.
- 4) The customer can use call spreads or put spreads to take advantage of a large risk reversal. For example, if the risk reversal is very bid for calls the customer may buy a call spread. The large risk reversal will reduce the cost of the call spread, because it increases the value of the out of the money option that the customer sells.
- 5) Call spreads and put spreads can be tailored to include features such as delayed premium or mini-premium.
- 6) Liquid, and can be reversed at any time.

■ **Disadvantages:**

- 1) The cap part of the spread restricts the customer's upside
- 2) The spread is more expensive to buy than the equivalent reverse knock-out option.
- 3) Requires premium

Knock-Out Call and Put Spreads

A call spread that knocks out if the spot rate trades at or below a predetermined level is called a knock-out call spread. The trigger level is always below the level of the call spread and the initial spot rate.

A put spread that knocks out if the spot rate trades at or beyond a predetermined level is called a knock-out put spread. The trigger level is always above the level of the put spread and the initial spot rate.

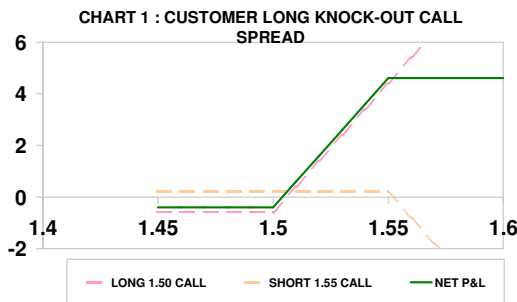
Example 1: Customer buys knock-out GBP call spread

Consider Cable (GBP/USD), spot rate at 1.50.
Customer buys GBP 100mio 1.50/1.55 GBP call spread with a knock-out at 1.45 for total premium of 40 cents per GBP

The components are as follows: The customer buys GBP 100mio of a 1.50 GBP Call USD Put with a 1.45 GBP knock-out and 6 months expiry at a premium of 60 cents per GBP. The customer sells GBP 100mio of a 1.55 GBP Call USD Put with a 1.45 GBP knock-out and 6 months expiry at a premium of 20 cents per GBP.

Customer pays USD 400,000 today.

During the 6 months period, if the spot trades at or below 1.45 then both GBP Calls are knocked-out and the call spread is terminated. If the spot rate never reaches 1.45 over the life of the option, the call spread will behave like a vanilla call spread with similar payoffs.



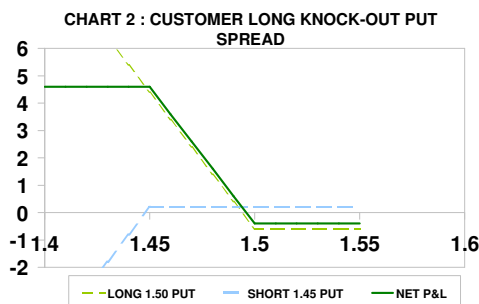
Example 2: Customer buys a knock-out GBP put spread

Consider Cable (GBP/USD), spot rate at 1.50
Customer buys a GBP 100mio 1.50/1.45 GBP put spread with a knock-out at 1.55 for a total premium of 40 cents per GBP.

The components are as follows: The customer buys GBP 100mio of a 1.50 GBP Put USD Call with a 1.55 GBP knock-out and 6 months expiry at a premium of 60 cents per GBP. The customer sells GBP 100mio of a 1.45 GBP Put USD Call with a 1.55 GBP knock-out and 6 months expiry at a premium of 20 cents per GBP.

Customer pays USD 400,000 today.

During the 6 months period, if the spot trades at or above 1.55 then both GBP Puts are knocked-out and the put spread is terminated. If the spot rate never reaches 1.55 over the life of the option, the put spread will behave like a vanilla put spread with similar payoffs.



Advantages:

- 1) In addition to the comments for call spreads and put spreads, a knock-out spread is cheaper than a vanilla call spread, so allows even better gearing.
- 2) Liquid, and can be reversed at any time.

Disadvantages:

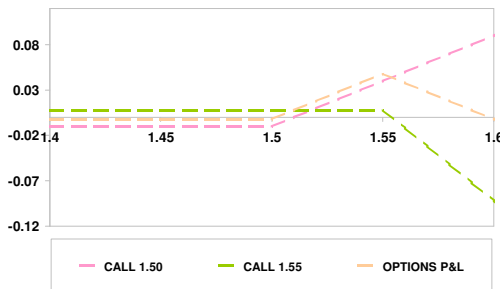
Unlike a vanilla call spread, it may knock-out and the holder will thus lose the upside on the call spread.

Ratio Call Spreads and Ratio Put Spreads

The purchaser of a ratio call spread buys a call with a low strike and sells a call with a higher strike for the same expiry date in a different face amount.

The purchaser of a ratio put spread buys a put with a high strike and sells a put with a lower strike and the same expiry date in a different face amount.

CHART 1 : CUSTOMER LONG RATIO CALL SPREAD



Example 1: Customer buys a GBP call spread

Consider Cable (GBP/USD), spot rate at 1.50.

The customer buys GBP100mio of a 6 month 1.50 / 1.55 GBP Call spread in a 1 by 2 ratio for a premium of 20 cents per GBP.

The components parts are as follows: The customer buys GBP 100mio of a 1.50 GBP Call USD Put with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 200mio of a 1.55 GBP Call USD Put with 6 months expiry at a premium of 40 cents per GBP.

Customer pays USD 200,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$

Both GBP Calls will expire out of the money and will not be exercised.

$1.50 < S_0 < 1.55$

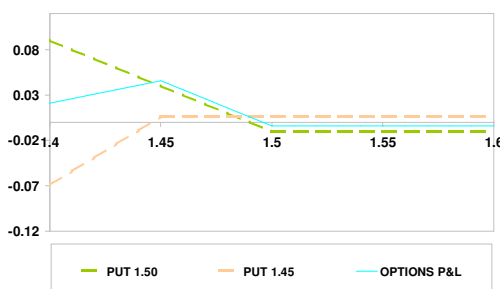
The customer will exercise the 1.50 GBP Call, buying GBP at 1.50. The 1.55 GBP Call will remain out of the money and is not exercised.

$S_0 > 1.55$

The customer exercises the 1.50 GBP Call, buying GBP at 1.50, the 1.55 will also be exercised obliging the customer to sell twice the amount of GBP at 1.55

The customer has a maximum payoff of USD 0.05 if spot is at 1.5500 at expiry, i.e. USD 5mio for a total profit of USD 4.8mio. If spot is above 1.6000, the payoff from the ratio call spread is negative.

CHART 2 : CUSTOMER LONG RATIO PUT SPREAD



Example 2: Customer buys a GBP put spread

Consider Cable (GBP/USD), spot rate at 1.50

The customer buys GBP100mio of a 6 month 1.50 / 1.45 GBP Put spread in a 2:3 ratio for a premium of 40 cents per GBP.

The component parts are as follows: The customer buys GBP 100mio of a 1.50 GBP Put USD Call with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 150mio of a 1.45 GBP Put USD Call with a 6 months expiry at a premium of 40 cents per GBP.

Customer pays USD 600,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

Both GBP Puts are exercised, the customer selling GBP at 1.50 and being obliged to buy 1.5 times the amount of GBP at 1.45

$1.45 < S_0 < 1.50$

The customer will exercise the 1.50 GBP Put, selling GBP at 1.50. The 1.45 GBP Put will remain out of the money and is not exercised.

$S_0 > 1.50$

Both GBP Puts will expire out of the money and will not be exercised.

The customer has a maximum payoff of USD 0.05 if spot is at 1.4500, i.e. USD 5mio for a total profit of USD4.6mio. If spot is below 1.35, the payoff from the ratio put spread is negative.

■ **Advantages:**

- 1) Usually the customer sells more face amount of options than he buys. This will make the ratio spread cheaper than the equivalent vanilla call spread.
- 2) It is often possible for the customer to buy ratio spreads for zero cost. This is often easier to achieve in the presence of a large risk reversal, in which case the option the customer sells in larger amount will be trading at a higher implied volatility and thus the customer receives comparatively more premium to sell it.
- 3) Depending on the ratio of the spread, the customer may buy or sell implied volatility. Typically, the customer will be buying implied volatility here, and selling a considerable amount of volatility in the region of the option he sells. This is often suitable for currency convergence trades, when the customer expects sport to move towards a convergence region, and then for the volatility to decline sharply as convergence looms.
- 4) Ratio spreads can be tailored, for example to include knock-outs or mini-premium features.
- 5) Liquid, and can be reversed at any time.

■ **Disadvantages:**

- 1) If the customer sells more face amount of options than he buys, then if the spot moves a long way in the desired direction (significantly beyond the strike he sells), then the payoff from the call spread may be negative. In the extreme, the customer has unlimited downside, because he is selling more options than he is buying.
- 2) The ratio spread is more expensive to buy than the equivalent reverse knock-out option.

Barrier Box Option

The owner of a Barrier Box Option receives a fixed payout if spot stays within a range. If spot is outside the range at expiry, the customer **may** have to enter an unfavourable spot transaction at expiry.

Example 1: Customer buys Barrier Box Option

Consider Cable (GBP/USD), spot rate is at 1.50.

Customer buys 6 months 1.45/1.55 barrier box for zero cost. Notional is GBP10mio

If spot stays between 1.45/1.55 the customer receives USD1mio [$\text{GBP10mio} \times (1.55 - 1.45)$].

If spot trades at or above 1.55, customer becomes short GBP10mio at 1.55 with a knock out at 1.45. Therefore, if GBP stays above 1.45 customer is short GBP 10mio at 1.55 at expiry.

If spot trades at or below 1.45, customer becomes long GBP 10mio at 1.45 with a knock out at 1.55. Therefore if GBP stays below 1.55 customer is long GBP 10mio at 1.45 at expiry.

If spot trades at or below 1.45 and at or above 1.55 the option knocks out completely

Example 2: Customer sells Barrier Box option.

Consider Cable (GBP/USD), spot rate is at 1.50.

Customer sells 6 months 1.45/1.55 barrier box for zero premium. Notional is GBP10mio.

If spot stays between 1.45/1.55 the customer pays USD1mio [$\text{GBP10mio} \times (1.55 - 1.45)$].

If spot trades at or above 1.55, customer becomes long GBP10mio at 1.55 with a knock out at 1.45. Therefore, if GBP stays above 1.45 customer is long GBP 10mio at 1.55 at expiry.

If spot trades at or below 1.45, customer becomes short GBP 10mio at 1.45 with a knock out at 1.55. Therefore if GBP stays below 1.55 customer is short GBP 10mio at 1.45 at expiry.

If spot trades at or below 1.45 and at or above 1.55 the option knocks out completely

Advantages:

- 1) Because the trade has downside risk if one of the barriers are breached, a barrier box option is cheaper to buy than the equivalent range bet.
- 2) If the customer buys a barrier box option, the customer may find that spot has breached one boundary, but that the spot transaction at expiry is still favourable.
- 3) If the customer buys a barrier box option, the customer is selling implied volatility.
- 4) Buying a barrier box option is an aggressive and often highly leveraged way to take advantage of anticipated quiet markets.
- 5) Customised, allows customer to tailor positions more efficiently to his needs/views.
- 6) Reasonably liquid, can be reversed at any time.

CHART 1 : CUSTOMER BUYS BARRIER BOX OPTION

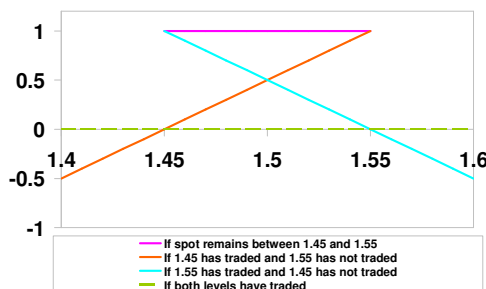
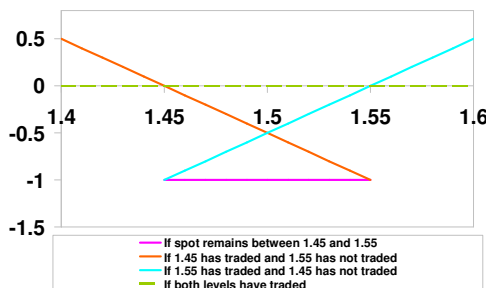


CHART 2 : CUSTOMER SELLS BARRIER BOX OPTION



■ Disadvantages:

- 1) The customer may have to enter an unfavourable spot transaction if spot has breached one but not both barriers at expiry.
- 2) Unlike range bets, the purchaser of a barrier box option has unlimited downside.
- 3) If customer's view regarding appropriate barrier levels changes, customer will have to restructure his position.

Straddle

A straddle is the combination of both a call and a put with the same strike and for the same expiry date. A purchaser buys both the call and the put. This is designed to enable the customer to take advantage of a sizeable move in the spot rate in either direction.

Example 1: Customer buys a GBP straddle

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 50mio a leg of 6 month GBP 1.50 straddle for 400 cents total premium.

The component parts are as follows: The customer buys GBP 50mio 1.50 GBP Call USD Put with 6 months expiry at a premium of 220 cents per GBP. The customer buys GBP 50mio 1.50 GBP Put USD Call with 6 months expiry at a premium of 180 cents per GBP.

Customer pays USD 2mio today.

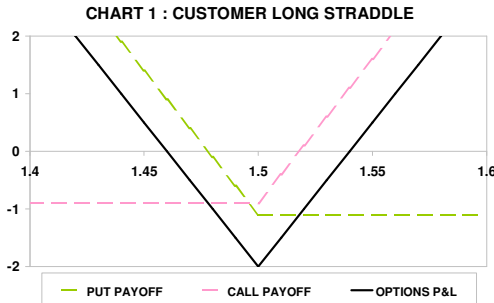
At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$

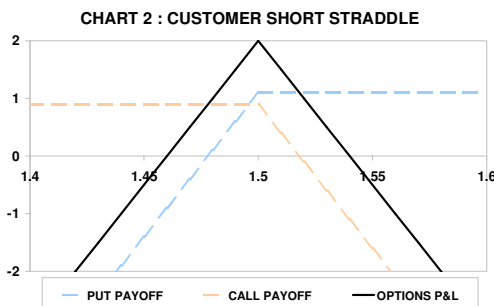
- Customer exercises the GBP Put, selling GBP at 1.50, generating a payoff of USD[(1.50 - S_0) * 50mio]. The GBP Call expires out of the money and is not exercised

$S_0 > 1.50$

- Customer exercises the GBP Call, buying GBP at 1.50, generating a payoff of USD[(S_0 - 1.50) * 50mio]. The GBP Put expires out of the money and is not exercised.



The strategy is in profit when $S_0 < 1.46$ or $S_0 > 1.54$.



The strategy is in profit when $1.46 < S_0 < 1.54$

Example 2: Customer sells a GBP straddle

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 50mio a leg of GBP 1.50 straddle for 400 cents total premium.

The component parts are as follows : The customer sells GBP 50mio 1.50 GBP Call USD Put with 6 months expiry at a premium of 220 cents per GBP. The customer sells GBP 50mio 1.50 GBP Put USD Call with 6 months expiry at a premium of 180 cents per GBP.

Customer receives USD 2mio today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$

The GBP Put is exercised and the Customer is obliged to buy GBP at 1.50, generating a loss of USD[(1.50 - S_0) * 50mio]. The GBP Call expires out of the money and is not exercised.

$S_0 > 1.50$

The GBP Call is exercised and the Customer is obliged to sell GBP at 1.50, generating a loss of USD[(S_0 - 1.50) * 50mio]. The GBP Put expires out of the money and is not exercised.

Advantages:

- 1) Buyer can take advantage of expected price movements in either direction
- 2) Buyer of straddle has limited downside
- 3) Buying a straddle is a good way to buy volatility without directional view
- 4) Liquid

- 5) Seller can earn significant premium in quiet markets

■ **Disadvantages:**

- 1) Requires large premium upfront for buyer
- 2) Seller has unlimited downside

Strangle

A strangle is the combination of buying a call and a put with different strikes for the same expiry date. This is designed to enable the purchaser to take advantage of a sizeable move in the spot rate in any direction without incurring the substantial costs of a straddle.

Example 1: Customer buys a GBP strangle

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 50mio a leg of 1.45 / 1.55 strangle for a total premium of 80 cents per GBP.

The component parts are as follows: The customer buys GBP 50mio of a 1.55 GBP Call USD Put with 6 months expiry at a premium of 50 cents per GBP. The customer buys GBP 50mio of a 1.45 GBP Put USD Call with 6 months expiry at a premium of 30 cents per GBP.

Customer pays USD 400,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

Customer exercises the GBP Put, selling GBP at 1.45, generating a payoff of USD $[(1.45 - S_0) * 50\text{mio}]$. The GBP Call expires out of the money and is not exercised.

$1.45 < S_0 < 1.55$

Both the GBP Call and the GBP Put expire out of the money and are not exercised.

$S_0 > 1.55$

Customer exercises the GBP Call, buying GBP at 1.55, generating a payoff of USD $[(S_0 - 1.55) * 50\text{mio}]$. The GBP Put expires out of the money and is not exercised.

Example 2: Customer sells a GBP strangle

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 50mio a leg of 1.45 / 1.55 strangle for total premium of 80 cents per GBP.

The component parts are as follows: The customer sells GBP 50mio of a 1.55 GBP Call USD Put with 6 months expiry at a premium of 50 cents per GBP. The customer sells GBP 50mio of a 1.45 GBP Put USD Call with 6 months expiry at a premium of 30 cents per GBP.

Customer receives USD 400,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

- The GBP Put is exercised and the Customer is obliged to buy GBP at 1.45, generating a loss of USD $[(1.45 - S_0) * 50\text{mio}]$. The GBP Call expires out of the money and is not exercised.

$1.45 < S_0 < 1.55$

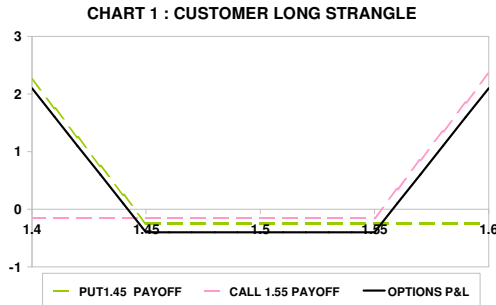
- Both the GBP Call and the GBP Put expire out of the money and are not exercised.

$S_0 > 1.55$

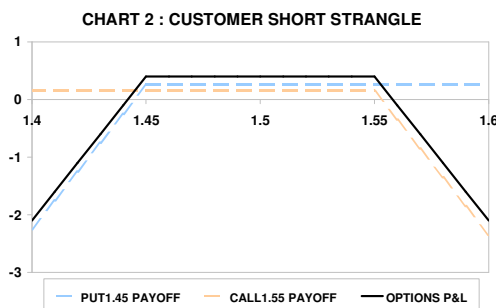
- The GBP Call is exercised and the Customer is obliged to sell GBP at 1.55, generating a loss of USD $[(S_0 - 1.55) * 50\text{mio}]$. The GBP Put expires out of the money and is not exercised.

■ Advantages:

- 1) Seller can take advantage of expected price stability, and profit if spot is in a range
- 2) Buyer of strangle has limited downside



The strategy is in profit when $S_0 < 1.4420$ or $S_0 > 1.5580$



The strategy is in profit when $1.4420 < S_0 < 1.5580$

- 3) Cheaper than straddle
- 4) The buyer of a strangle is buying implied volatility. They usually buy 'out of the money' volatility, whereas the buyers of straddles usually buy 'at the money' volatility. This means that buyers of strangles are better geared for large moves in implied volatility.
- 5) Liquid

■ **Disadvantages:**

- 1) Seller has unlimited downside
- 2) Buyer only profits on large moves, unless he closed out before expiry.

Butterfly

A butterfly is the combination of a straddle and a strangle. The buyer of the butterfly will buy a straddle and sell a strangle. One of the strikes of the strangle is below the strike of the straddle, the other above. This is designed to enable the customer to take advantage of a small move in the spot rates whilst limiting the cost.

Example 1: Customer trades a GBP butterfly, buying the straddle

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 50mio a leg of 1.50 straddle at a premium of 400 cents per GBP, and sells GBP 50mio a leg of 1.45 / 1.55 strangle at a premium of 80 cents per GBP.

The component parts are as follows : The customer sells GBP 50mio 1.45 GBP Put USD Call, buys GBP 50mio 1.50 GBP Call USD Put, buys GBP 50mio 1.50 GBP Put USD Call and sells USD50mio 1.55 GBP Call USD Put for a total premium of 320 cents per GBP.

Customer pays USD 1.6mio today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

The customer exercises the 1.50 GBP Put, selling GBP at 1.50, and the 1.45 GBP Put is exercised obliging the customer to buy GBP at 1.45 generating a combined payoff of USD 2.5mio. The GBP Calls expire out of the money and are not exercised.

$1.45 < S_0 < 1.50$

The customer exercises the 1.50 GBP Put, selling GBP at 1.50, generating a payoff of USD $[(1.50 - S_0) * 50\text{mio}]$. The remaining GBP Put and GBP Calls expire out of the money and are not exercised.

$1.50 < S_0 < 1.55$

The customer exercises the 1.50 GBP Call, buying GBP at 1.50, generating a payoff of USD $[(S_0 - 1.50) * 50\text{mio}]$. The 1.55 GBP Call and the GBP Puts expire out of the money and are not exercised. The customer exercises the 1.50 GBP Call, buying GBP at 1.50, and the 1.55 GBP Call is exercised obliging the customer to sell GBP at 1.55, generating a combined payoff of USD 2.5mio. The GBP Puts expire out of the money and are not exercised.

$S_0 > 1.55$

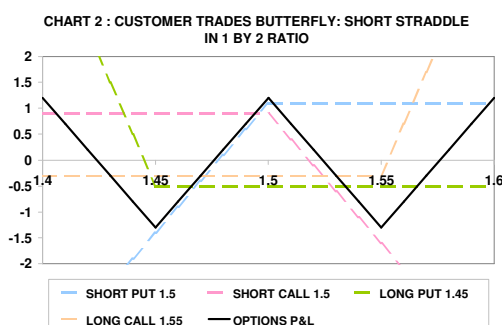
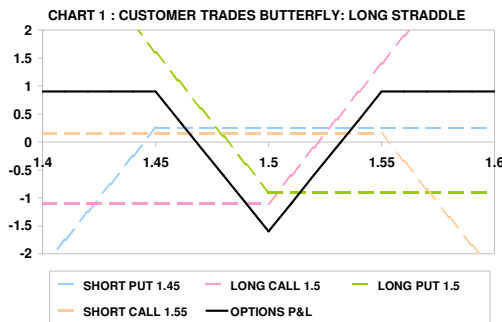
*The strategy is in profit when
 $S_0 < 1.468$ and $S_0 > 1.532$.
The maximum profit is USD
900,000*

Example 2: Customer trades a GBP butterfly, selling the straddle in 1 by 2 ratio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer sells GBP 50mio a leg of 1.50 straddle at a premium of 400 cents per GBP, and buys GBP 100mio a leg of 1.45 / 1.55 strangle at a premium of 80 cents per GBP.

The component parts are as follows : The customer buys GBP 100mio 1.45 GBP Put USD Call, sells GBP 50mio 1.50 GBP Call USD Put, sells GBP 50mio 1.50 GBP Put USD Call and buys USD100mio 1.55 GBP Call USD Put



Customer receives USD 1.2mio today.

*The strategy is in profit when
 $S_0 < 1.424$, $1.476 < S_0 < 1.524$
and $S_0 > 1.576$.*

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.45$

The customer exercises the 1.45 GBP Put, selling GBP 100mio at 1.45, and the 1.50 GBP Put is exercised obliging the customer to buy GBP 50mio at GBP 1.50 generating a combined payoff of $\text{USD}[(1.45 - S_0) * 100\text{mio} - (1.50 - S_0) * 50\text{mio}] = \text{USD}[(1.40 - S_0) * 50\text{mio}]$. The GBP Calls expire out of the money and are not exercised.

$1.45 < S_0 < 1.50$

The 1.50 GBP Put is exercised obliging the customer to buy GBP 50mio at 1.50, generating a payoff of $\text{USD}[(S_0 - 1.50) * 50\text{mio}]$. The remaining GBP Put and GBP Calls expire out of the money and are not exercised.

$1.50 < S_0 < 1.55$

The 1.50 GBP Call is exercised obliging the customer to sell GBP 50mio at 1.50, generating a payoff of $\text{USD}[(1.50 - S_0) * 50\text{mio}]$. The 1.55 GBP Call and the GBP Puts expire out of the money and are not exercised.

$S_0 > 1.55$

The customer exercises the 1.55 GBP Call, buying GBP 100mio at 1.50, and the 1.50 GBP Call is exercised obliging the customer to sell GBP at 1.50, generating a combined payoff of $\text{USD}[(S_0 - 1.55) * 100\text{mio} - (S_0 - 1.50) * 50\text{mio}]$. The GBP Puts expire out of the money and are not exercised.

■ Advantages:

- 1) Seller of an At-The-Money straddle receives premium and so can take advantage of expected price stability
- 2) Seller of straddle has downside limited by strangle strikes, if he enters the strategy in a 1 : 1 ratio.
- 3) Purchaser of straddle has downside limited to premium paid, if he enters the strategy in a 1:1 ratio.
- 4) Cheaper than straddle and strangle
- 5) For the buyer of the straddle, this strategy provides more leverage in the case of small spot moves than other non-directional strategies
- 6) The buyer of the straddle is buying at the money volatility and selling out of the money volatility. They may do this if they feel that the implied volatility smile is too steep.
- 7) The seller of the straddle is selling at the money volatility and buying out of the money volatility. They may do this if they feel that the implied volatility smile is too shallow.

■ Disadvantages:

- 1) Seller of straddle earns less premium than selling straddle alone
- 2) Buyer of straddle has upside limited by strangle strikes
- 3) Provides less leverage in the case of large moves than other option strategies

Caterpillar

A bearish caterpillar is the combination of buying an out the money put with a strike X_1 , selling two out the money puts with a strike X_2 and buying a further out the money put with a strike X_3 where $X_3 < X_2 < X_1 < S_0$, all with the same expiry date.

A bullish caterpillar is the combination of buying an out the money call with a strike X_1 , selling two out the money calls with a strike X_2 and buying a further out the money call with a strike X_3 where $X_3 > X_2 > X_1 > S_0$ all with the same expiry date.

These are designed to enable the customer to take advantage of an expected move in the spot rate in a certain direction whilst limiting the cost.

Example 1: Customer trades a bearish GBP caterpillar

Consider Cable (GBP/USD), spot rate at 1.50.

The customer buys GBP50mio of a 6 month 1.50 : 1.45 : 1.40 GBP bearish caterpillar in 1 : 2 : 1 ratio for 45 cents per GBP.

The component parts are as follows : The customer buys GBP 50mio of 1.50 GBP Put USD Call with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 100mio of 1.45 GBP Put USD Call with 6 months expiry at a premium of 40 cents per GBP. The customer buys GBP 50mio of 1.40 GBP Put USD Call with 6 months expiry at a premium of 25 cents per GBP.

Customer pays USD 225,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.40$

The customer exercises the 1.40 GBP Put and the 1.50 GBP Put selling a combined GBP 100mio at an average of 1.45, and the two 1.45 GBP Puts are exercised obliging the customer to buy GBP 100mio at 1.45. Total payoff is nil.

$1.40 < S_0 < 1.45$

The customer exercises the 1.50 GBP Put selling 50mio GBP at 1.50 and the two 1.45 GBP Puts are exercised obliging the customer to buy GBP 100mio at 1.45. The remaining 1.40 GBP Put expires out of the money and is not exercised. Total payoff to the customer is USD $[(S_0 - 1.40) * 50\text{mio}]$.

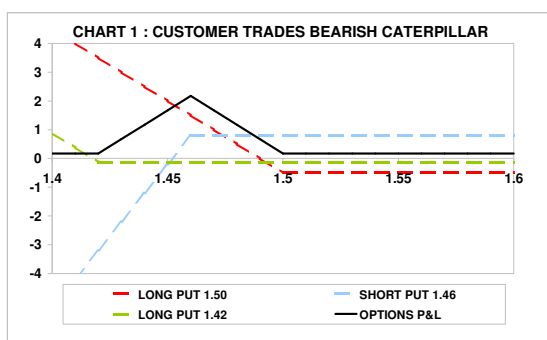
$1.45 < S_0 < 1.50$

The customer exercises the 1.50 GBP Put selling 50mio GBP at 1.50. The remaining GBP Puts expire out of the money and are not exercised. Total payoff to the customer is USD $[(1.50 - S_0) * 50\text{mio}]$.

$S_0 > 1.50$

All the GBP Puts expire out of the money and are not exercised.

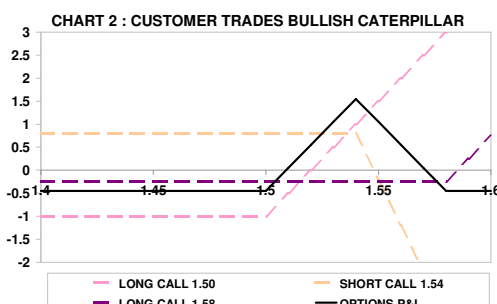
*The strategy is in profit when
 $1.4045 < S_0 < 1.4955$
 The maximum profit is USD
 2,275,000*



Example 2: Customer trades a bullish GBP caterpillar

Consider Cable (GBP/USD), spot rate at 1.50.

The customer buys GBP50mio of a 6 month 1.50 : 1.55 : 1.60 GBP bullish



caterpillar in 1 : 2 : 1 ratio for 45 cents per GBP.

The component parts are as follows : The customer buys GBP 50mio of 1.50 GBP Call USD Put with 6 months expiry at a premium of 100 cents per GBP. The customer sells GBP 100mio of 1.55 GBP Call USD Put with 6 months expiry at a premium of 40 cents per GBP The customer buys one GBP 50mio of 1.60 GBP Call USD Put with 6 months expiry at a premium of 25 cents per GBP.

*The strategy is in profit when
 $1.5045 < S_0 < 1.5955$
 The maximum profit is USD
 2,275,000*

Customer pays USD 225,000 today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$	All the GBP Calls expire out of the money and are not exercised.
$1.50 < S_0 < 1.55$	The customer exercises the 1.50 GBP Call buying 50mio GBP at 1.50. The remaining GBP Calls expire out of the money and are not exercised. Total payoff to the customer is USD $[(S_0 - 1.50) * 50\text{mio}]$.
$1.55 < S_0 < 1.60$	The customer exercises the 1.50 GBP Call buying 50mio GBP at 1.50 and the two 1.55 GBP Calls are exercised obliging the customer to sell GBP 100mio at 1.55. The remaining 1.60 GBP Call expires out of the money and is not exercised. Total payoff to the customer is USD $[(1.60 - S_0) * 50\text{mio}]$.
$S_0 > 1.60$	The customer exercises the 1.50 GBP Call and the 1.60 GBP Put buying a combined GBP 100mio at an average of 1.55, and the two 1.55 GBP Calls are exercised obliging the customer to sell GBP 100mio at 1.55. Total payoff is nil.

■ Advantages:

- 1) Provides cheap and leveraged way of taking a position on future spot rate
- 2) It is often cheaper than the equivalent call spread or put spread.
- 3) In a 1 : 2 : 1 ratio, the buyer does not have the unlimited downside that he would have from a 1 : 2 ratio spread.
- 4) Depending on the ratio of the legs, the customer may buy or sell implied volatility. Typically, the customer will be buying implied volatility here, and selling a considerable amount of volatility in the region of the option he sells. This is often suitable for currency convergence trades, when the customer expects sport to move towards a convergence region, and then for the volatility to decline sharply as convergence looms.
- 5) Downside limited to the small premium paid

■ Disadvantages:

- 1) Provides less profit than other strategies if rates move as customer expects
- 2) Customer only profits if rates move in the right direction and to the right range

Wedding cake

A wedding cake provides the buyer with a variable fixed payment depending on the trading range of the underlying spot rate between the trade date and the expiry date.

Example 1: Customer buys the option.

Consider GBP/USD spot at 1.50.

A customer buys a 6 week wedding cake option on GBP/USD, with a rebate of USD1mio if the spot rate remains between 1.43 and 1.57 and with rebate of USD2mio if the spot rate remains between 1.46 and 1.54, for a cost of 10%.

The customer pays USD200,000 now

If in the following 6 weeks the spot rate trades between 1.46 and 1.54 the customer gets paid USD2mio two business days after the expiry date.

If in the following 6 weeks the spot rate trades between 1.43 and 1.57 the customer gets paid USD1mio two business days after the expiry date.

If any time in the following 6 weeks the spot rate trades below 1.43 or above 1.57 the customer gets paid nothing.

The maximum payment from this option is USD2mio.

Example 2: Customer sells the option

Consider GBP/USD spot at 1.50.

A customer sells a 6 week wedding cake option on GBP/USD, with a rebate of USD1mio if the spot rate is between 1.43 and 1.57 and with rebate of USD2mio if the spot rate is between 1.46 and 1.54, for a cost of 7%.

The customer receives USD140,000 now.

If in the following 6 weeks the spot rate trades between 1.46 and 1.54 the customer pays USD2mio two business days after the expiry date.

If in the following 6 weeks the spot rate trades between 1.43 and 1.57 the customer pays USD1mio two business days after the expiry date.

If at any time in the following 6 weeks the spot rate trades below 1.43 or above 1.57 the customer pays nothing.

The maximum payment liability from this option is USD2mio.

■ Advantages

- 1) Can offer good gearing
- 2) Enables customers to express exact views about expected spot behaviour.
- 3) Customer has smoother profile than for an individual range bet.
- 4) Like a range bet, the buyer of a wedding cake is selling implied volatility.
- 5) Wedding cakes can be used in structured notes, to provide a variable coupon payment.

■ Disadvantages

- 1) Fixed payout limits profit potential
- 2) Customer can lose entire premium

Rolling Strike Option

A rolling strike option is an option that has its strike price reset when the spot rate reaches pre-agreed trigger levels. Should the trigger levels never be reached then the option expires as originally agreed. This is designed to enable the customer to take advantage of an expected move in the spot rate whilst still being able to benefit from moves in the opposite direction.

Example 1: Customer buys GBP Call with rolling strike option

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.55 GBP Call USD Put with 6 months expiry at a premium of 120 cents per GBP, resetting to a 1.50 GBP Call USD Put if the spot rate reaches 1.45, and to 1.45 if the spot rate reaches 1.40.

Customer pays USD 1.2mio today.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.40$	The strike rate on the GBP Call is reset at 1.45 resulting in the customer having a 1.45 GBP Call at expiry.
$1.40 < S_{\min} < 1.45$	The strike rate on the GBP Call is reset at 1.50 resulting in the customer having a 1.50 GBP Call at expiry.
$S_{\min} > 1.45$	The strike rate on the GBP Call remains at 1.55 resulting in the customer having a 1.55 GBP Call at expiry.

Example 2: Customer buys GBP Put with rolling strike option

Consider Cable (GBP/USD), spot rate at 1.50.

Customer buys GBP 100mio 1.45 GBP Put USD Call with 6 months expiry at a premium of 120 cents per GBP, resetting to a 1.50 GBP Put USD Call if the spot rate reaches 1.55, and to 1.55 if the spot rate reaches 1.60.

Customer pays USD 1.2mio today.

Customer buys GBP 100mio 1.55 GBP Call USD Put with 6 months expiry at a premium of 120 cents per GBP, resetting to a 1.50 GBP Call USD Put if the spot rate reaches 1.45, and to 1.45 if the spot rate reaches 1.40.

Customer pays USD 1.2mio today.

During the 6 months period, the lowest GBP/USD spot rate (S_{\min}) trades at:

$S_{\min} < 1.50$	The strike rate on the GBP Put remains at 1.45 resulting in the customer having a 1.45 GBP Put at expiry.
$1.55 < S_{\min} < 1.60$	The strike rate on the GBP Put is reset at 1.50 resulting in the customer having a 1.50 GBP Put at expiry.
$S_{\min} > 1.60$	The strike rate on the GBP Put is reset at 1.55 resulting in the customer having a 1.55 GBP Put at expiry.

■ Advantages:

- 1) Customer can take advantage of spot rates moving in one direction whilst benefiting from spot rates moving against them by a resetting in the option strike.
- 2) Downside limited to the premium paid

■ Disadvantages:

- 1) The premium is larger than for a vanilla option.
- 2) Customer only profits if rates move in the right direction at expiry.

Gold Medal Option

A gold medal option is an option that entitles the holder to the payoff from the best performing of three vanilla options, such payoff to be in an amount of a pre-agreed currency.

Example 1: Customer buys Gold medal Call

Consider Cable (GBP/USD) spot rate at 1.50, GBP/JPY spot rate at 190 and GBP/EUR spot rate at 1.55

Customer buys GBP 100mio of a 6 months best of GBP Call against USD, JPY and EUR, all struck at the money for a premium of 1.5%. At expiry, the customer receives $\text{GBP } 100\text{mio} * \max [(S_{ij} - K_{ij})/S_{ij}, 0]$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated call.

Customer pays GBP 1.5mio today.

As stated above, the strikes of the calls are 1.50, 190 and 1.55 respectively.

At expiry, if the spot rates are 1.55, 185 and 1.70 respectively then the return is:

$\max [(1.55-1.50)/1.55, (185-190)/1.85, (1.70-1.55)/1.70, 0] = \max [3.2\%, -2.7\%, 8.8\%, 0] = 8.8\%$. The customer receives $\text{GBP } 100\text{mio} * 8.8\% = \text{GBP } 8.8\text{mio}$.

If however the spot rates at expiry are 1.48, 175, 1.50 then all rates have depreciated and the customer's option expires out the money.

Example 2: Customer buys Gold medal Put

Consider Cable (GBP/USD) spot rate at 1.50, EUR/JPY spot rate at 120 and USD/SEK spot rate at 9.30

Customer buys GBP 100mio of a 6 months best of GBP Put against USD, EUR Put against JPY and USD Put against SEK, all struck at the money for a premium of 1.5%. At expiry, the customer receives $\text{GBP } 100\text{mio} * \max [(K_{ij} - S_{ij})/S_{ij}, 0]$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated put.

Customer pays GBP 1.5mio today.

As stated above, the strikes of the puts are 1.50, 120 and 9.30 respectively.

At expiry, if the spot rates are 1.43, 105 and 9.30 respectively then the return is:

$\max [(1.50-1.43)/1.43, (120-105)/105, (9.30-9.30)/9.30, 0] = \max [4.9\%, 14.3\%, 0\%, 0] = 14.3\%$. The customer receives $\text{GBP } 100\text{mio} * 14.3\% = \text{GBP } 14.3\text{mio}$.

If however the spot rates at expiry are 1.51, 135, 9.75 then all rates have appreciated and the customer's option expires out the money.

■ Advantages:

- 1) Allows customer to take views on a number of assets at the same time.
- 2) Option is less expensive than vanilla options on each of the assets.

■ Disadvantages:

- 1) The premium is larger than for a vanilla option on one of the assets.
- 2) Complex option with no secondary market.

Silver Medal Option

A silver medal option is an option that entitles the holder to the payoff from the second best performing of three vanilla options, such payoff to be in an amount of a pre-agreed currency.

Example 1: Customer buys Silver medal Call

Consider Cable (GBP/USD) spot rate at 1.50, GBP/JPY spot rate at 190 and GBP/EUR spot rate at 1.55

Customer buys GBP 100mio of a 6 months second best of GBP Call against USD, JPY and EUR, all struck at the money for a premium of 0.6%. At expiry, the customer receives GBP 100mio * second max $[(S_{ij} - K_{ij})/S_{ij}, 0]$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated call.

Customer pays GBP 600,000 today.

As stated above, the strikes of the calls are 1.50, 190 and 1.55 respectively.

At expiry, if the spot rates are 1.55, 185 and 1.70 respectively then the return is:

second max $[(1.55-1.50)/1.55, (185-190)/185, (1.70-1.55)/1.70, 0] = \text{second max } [3.2\%, -2.7\%, 8.8\%, 0] = 3.2\%$. The customer receives GBP 100mio * 3.2% = GBP 3.2mio.

If however the spot rates at expiry are 1.48, 175, 1.50 then all rates have depreciated and the customer's option expires out the money.

Example 2: Customer buys Silver medal Put

Consider Cable (GBP/USD) spot rate at 1.50, EUR/JPY spot rate at 120 and USD/SEK spot rate at 9.30

Customer buys GBP 100mio of a 6 months second best of GBP Put against USD, EUR Put against JPY and USD Put against SEK, all struck at the money for a premium of 0.6%. At expiry, the customer receives GBP 100mio * second max $[(K_{ij} - S_{ij})/S_{ij}, 0]$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated put.

Customer pays GBP 600,000 today.

As stated above, the strikes of the puts are 1.50, 120 and 9.30 respectively.

At expiry, if the spot rates are 1.43, 105 and 9.30 respectively then the return is:

second max $[(1.50-1.43)/1.43, (120-105)/105, (9.30-9.30)/9.30, 0] = \text{second max } [4.9\%, 14.3\%, 0\%, 0] = 4.9\%$. The customer receives GBP 100mio * 4.9% = GBP 4.9mio.

If however the spot rates at expiry are 1.51, 135, 9.75 then all rates have appreciated and the customer's option expires out the money.

■ Advantages:

- 1) Allows customer to take views on a number of assets at the same time.
- 2) Cheaper than Gold medal option.
- 3) Option is less expensive than vanilla options on each of the assets.

■ Disadvantages:

- 1) The premium may be larger than for a vanilla option on one of the assets.
- 2) Customer only profits if rates move in the right direction at expiry on two of the assets.
- 3) Complex option with no secondary market.

Rainbow Option

A rainbow option is an option that entitles the holder to a payoff calculated from a pre-defined percentage of each of three vanilla options based upon their relative returns, such payoff to be in an amount of a pre-agreed currency.

Example 1: Customer buys Rainbow Call

Consider Cable (GBP/USD) spot rate at 1.50, GBP/JPY spot rate at 190 and GBP/EUR spot rate at 1.55

Customer buys GBP 100mio of a 6 months Rainbow GBP Call against USD, JPY and EUR, all struck at the money for a premium of 1%. At expiry, the customer receives 50% of the return of the best performing call, 30% of the return of the second best call and 20% of the return of the worst performing call, where returns are calculated by $\max[(S_{ij} - K_{ij})/S_{ij}, 0]$ for each call.

Customer pays GBP 1mio today.

As stated above, the strikes of the calls are 1.50, 190 and 1.55 respectively.

At expiry, if the spot rates are 1.55, 185 and 1.70 respectively then the returns are:

$\max[(1.55-1.50)/1.55, 0] = 3.2\%$, $\max[(185-190)/185, 0] = 0\%$, and $\max[(1.70-1.55)/1.70, 0] = 8.8\%$ respectively. The customer receives GBP 100mio * $[(0.5 * 8.8\%) + (0.3 * 3.2\%) + (0.2 * 0\%)] = \text{GBP } 5.36\text{mio}$.

If however the spot rates at expiry are 1.48, 175, 1.50 then all rates have depreciated and the customer's option expires out the money.

Example 2: Customer buys Rainbow Put

Consider Cable (GBP/USD) spot rate at 1.50, EUR/JPY spot rate at 120 and USD/SEK spot rate at 9.30

Customer buys GBP 100mio of a 6 months Rainbow GBP Put against USD, EUR Put against JPY and USD Put against SEK, all struck at the money for a premium of 1%. At expiry, the customer receives 50% of the return of the best performing put, 30% of the return of the second best put and 20% of the return of the worst performing put, where returns are calculated by $\max[(K_{ij} - S_{ij})/S_{ij}, 0]$ for each put.

Customer pays GBP 900,000 today.

As stated above, the strikes of the puts are 1.50, 120 and 9.30 respectively.

At expiry, if the spot rates are 1.43, 105 and 9.30 respectively then the returns are:

$\max[(1.50-1.43)/1.43, 0] = 4.9\%$, $\max[(120-105)/105, 0] = 14.3\%$, and $\max[(9.30-9.30)/9.30, 0] = 0\%$ respectively. The customer receives GBP 100mio * $[(0.5 * 14.3\%) + (0.3 * 4.9\%) + (0.2 * 0\%)] = \text{GBP } 8.62\text{mio}$.

If however the spot rates at expiry are 1.51, 135, 9.75 then all rates have appreciated and the customer's option expires out the money.

■ Advantages:

- 1) Allows customer to take views on a number of assets at the same time.
- 2) Cheaper than Gold medal option.
- 3) Option is less expensive than vanilla options on each of the assets.

■ Disadvantages:

- 1) The premium may be larger than for a vanilla option on one of the assets.
- 2) Customer only profits if rates move in the right direction at expiry on at least one of the assets.
- 3) Complex option with no secondary market.

Worst of 2 Option

A worst of 2 option is an option that entitles the holder to the payoff from the worst performing of two vanilla options, such payoff to be in an amount of a pre-agreed currency.

Example 1: Customer buys Worst of 2 Call

Consider Cable (GBP/USD) spot rate at 1.50 and GBP/JPY spot rate at 190. Customer buys GBP 100mio of a 6 months Worst of 2 GBP Call against USD and JPY, both struck at the money for a premium of 0.2%. At expiry, the customer receives $\text{GBP } 100\text{mio} * \max \{ \min [(S_{ij} - K_{ij})/S_{ij}], 0 \}$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated call.

Customer pays GBP 200,000 today.

As stated above, the strikes of the calls are 1.50 and 190 respectively.

At expiry, if the spot rates are 1.55 and 210 respectively then the return is:

$\text{Max} \{ \min [(1.55-1.50)/1.55, (210-190)/210], 0 \} = \max \{ \min [3.2\%, 7.7\%], 0 \} = 3.2\%$. The customer receives $\text{GBP } 100\text{mio} * 3.2\% = \text{GBP } 3.2\text{mio}$.

If however the spot rates at expiry are 1.48 and 175 then all rates have depreciated and the customer's option expires out the money.

Example 2: Customer buys Worst of 2 Put

Consider Cable (GBP/USD) spot rate at 1.50 and EUR/JPY spot rate at 120. Customer buys GBP 100mio of a 6 months worst of 2 GBP Put against USD and EUR Put against JPY, both struck at the money for a premium of 0.2%. At expiry, the customer receives $\text{GBP } 100\text{mio} * \max \{ \min [(K_{ij} - S_{ij})/S_{ij}], 0 \}$ where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated put.

Customer pays GBP 200,000 today.

As stated above, the strikes of the puts are 1.50 and 120 respectively.

At expiry, if the spot rates are 1.43 and 105 respectively then the return is:

$\max \{ \min [(1.50-1.43)/1.43, (120-105)/105], 0 \} = \max \{ \min [4.9\%, 14.3\%], 0 \} = 4.9\%$. The customer receives $\text{GBP } 100\text{mio} * 4.9\% = \text{GBP } 4.9\text{mio}$.

If however the spot rates at expiry are 1.51 and 135 then all rates have appreciated and the customer's option expires out the money.

■ Advantages:

- 1) Allows customer to take views on a number of assets at the same time.
- 2) Lower premiums than Gold and Silver medal options.
- 3) Offers significant discount to gold medal options, or to individual vanilla options. Can be particularly attractive if the customer expects the two assets to be highly correlated (in example 1, if GBPUSD and GBPJPY are highly correlated) and if the implied cross volatility is high (in example 1, if USDJPY implied volatility is high).

■ Disadvantages:

- 1) Customer only profits if rates move in the right direction at expiry on both

-
- of the assets.
- 2) Complex option with no secondary market.

Worst of 3 Option

A worst of 3 option is an option that entitles the holder to the payoff from the worst performing of three vanilla options, such payoff to be in an amount of a pre-agreed currency.

Example 1: Customer buys Worst of 3 Call

Consider Cable (GBP/USD) spot rate at 1.50, GBP/JPY spot rate at 190, and EUR/CHF spot rate at 1.45

Customer buys GBP 100mio of a 6 months Worst of 3 GBP Call against USD and JPY, and EUR Call against CHF, all struck at the money for a premium of 0.05%. At expiry, the customer receives GBP 100mio * max {min [(S_{ij} - K_{ij})/S_{ij}], 0} where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated call.

Customer pays GBP 50,000 today.

As stated above, the strikes of the calls are 1.50, 190 and 1.45 respectively.

At expiry, if the spot rates are 1.55, 210 and 1.48 respectively then the return is:

Max {min [(1.55-1.50)/1.55, (210-190)/210, (1.48-1.45)/1.48], 0} = max {min [3.2%, 7.7%, 2.0%] 0} = 2.0%. The customer receives GBP 100mio * 2.0% = GBP 2mio.

If however the spot rates at expiry are 1.48, 175 and 1.40 then all rates have depreciated and the customer's option expires out the money.

Example 2: Customer buys Worst of 3 Put

Consider Cable (GBP/USD) spot rate at 1.50, EUR/JPY spot rate at 120 and USD/SEK spot rate at 9.30

Customer buys GBP 100mio of a 6 months worst of 3 GBP Put against USD, EUR Put against JPY and USD Put against SEK, all struck at the money for a premium of 0.05%. At expiry, the customer receives GBP 100mio * max {min [(K_{ij} - S_{ij})/S_{ij}], 0} where S_{ij} is each of the spot rates of the cross currencies and K_{ij} is the strike price of the associated put.

Customer pays GBP 50,000 today.

As stated above, the strikes of the puts are 1.50, 120 and 9.30 respectively.

At expiry, if the spot rates are 1.43, 105 and 8.75 respectively then the return is:

max {min [(1.50-1.43)/1.43, (120-105)/105, (9.30-8.75)/8.75], 0} = max {min [4.9%, 14.3%, 6.3%], 0} = 4.9%. The customer receives GBP 100mio * 4.9% = GBP 4.9mio.

If however the spot rates at expiry are 1.51, 135 and 9.55 then all rates have appreciated and the customer's option expires out the money.

■ Advantages:

- 1) Allows customer to take views on a number of assets at the same time.
- 2) Lower premiums than Gold and Silver medal options.

■ Disadvantages:

- 1) Customer only profits if rates move in the right direction at expiry on all three of the assets.
- 2) Complex option with no secondary market.

Range Deposit

With a range deposit, the customer deposits cash with Merrill Lynch for a specified period of time. The yield obtained at the end of the period of time is guaranteed to be at a particular level, but with an improvement if the spot exchange rate for a specified currency stays within a specified range. This enables the customer to benefit if spot trades within a narrow range.

Example 1: Customer deposits GBP 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits GBP 100mio for 6 months at 2% per annum plus 8% per annum if spot remains within 1.45 / 1.55 range throughout the next six months.

At expiry, we look at the highest spot level throughout the past 6 months (S_{\max}) and the lowest spot level over the past 6 months (S_{\min}).

$S_{\min} < 1.45$	- S_{\min} is outside the range and the customer receives 2% p.a. on GBP100mio.
$S_{\max} > 1.55$	- S_{\max} is outside the range and the customer receives 2% p.a. on GBP100mio.
Otherwise	- Spot has stayed with the range and the customer receives 10% p.a. on GBP100mio.

Example 2: Customer deposits EUR 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits EUR100mio for 3 months at 2% per annum plus 6% per annum if spot remains within 1.45 / 1.55 range throughout the next three months.

At expiry, we look at the highest spot level throughout the past 3 months (S_{\max}) and the lowest spot level over the past 3 months (S_{\min}).

$S_{\min} < 1.45$	- S_{\min} is outside the range and the customer receives 2% p.a. on EUR100mio.
$S_{\max} > 1.55$	- S_{\max} is outside the range and the customer receives 2% p.a. on EUR100mio.
Otherwise	- Spot has stayed with the range and the customer receives 8% p.a. on EUR100mio.

■ Advantages:

- 1) Customer benefits from a better rate if spot stays within their range.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Customer is able to get a high yield.
- 4) Customer is selling implied volatility.
- 5) The customer can earn enhanced yield based on the behaviour of currencies other than the one which he deposits.
- 6) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If FX rates move against the customer they receive a lower coupon than a vanilla deposit

Range Note

With a range note, the customer purchases a note. The coupon obtained at the end of the period of time is guaranteed to be at a particular level, but with an improvement if the spot exchange rate for a specified currency stays within a specified range. This enables the customer to benefit if spot trades within a narrow range.

Example 1: Customer purchases GBP denominated range note.

Consider Cable (GBP/USD), spot rate at 1.50.
Customer purchases GBP 100mio of a 6 month GBP/USD range note at par.
Coupon at maturity is 2% per annum plus 8% per annum if spot remains within 1.45 / 1.55 range throughout the next six months.

Customer pays GBP10mio now.

At expiry, we look at the highest spot level throughout the past 6 months (S_{\max}) and the lowest spot level over the past 6 months (S_{\min}).

$S_{\min} < 1.45$	S_{\min} is outside the range and the customer receives 2% p.a. on GBP10mio.
$S_{\max} > 1.55$	S_{\max} is outside the range and the customer receives 2% p.a. on GBP10mio.
Otherwise	Spot has stayed with the range and the customer receives 10% p.a. on GBP10mio.

*Customer then receives
GBP10mio plus the relevant
coupon.*

Example 2: Customer purchases EUR denominated range note

Consider Cable (GBP/USD), spot rate at 1.50.
Customer purchases EUR100mio of a 3 month GBP/USD range note at par.
Coupon at maturity is 2% per annum plus 6% per annum if spot remains within 1.45 / 1.55 range throughout the next three months.

Customer pays EUR10mio now.

At expiry, we look at the highest spot level throughout the past 3 months (S_{\max}) and the lowest spot level over the past 3 months (S_{\min}).

$S_{\min} < 1.45$	- S_{\min} is outside the range and the customer receives 2% p.a. on EUR10mio.
$S_{\max} > 1.55$	- S_{\max} is outside the range and the customer receives 2% p.a. on EUR10mio.
Otherwise	- Spot has stayed with the range and the customer receives 8% p.a. on EUR10mio.

*Customer then receives
EUR10mio plus the relevant
coupon.*

■ Advantages:

- 1) Customer benefits from a better rate if spot stays within their range.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Notes are issued by Merrill Lynch. Alternatively, Merrill Lynch can arrange for a mutually agreed third party issuer.
- 4) Customer will normally buy the note at parity and have a capital guarantee, with the possibility of a high coupon.
- 5) The purchaser of the note will be selling implied volatility in the reference currency pair.
- 6) The customer can earn enhanced yield based on the behaviour of

- currencies other than the one in which the note is denominated.
- 7) Can be tailored to match customer's views and needs.

■ **Disadvantages:**

- 1) If FX rates move against the customer they receive a lower coupon than a vanilla note

Range Swap

With a range swap, the customer enters into an interest rate swap (fixed versus floating). The fixed interest leg of the swap is guaranteed to be at a particular level, but with an improvement if the spot exchange rate for a specified currency stays within a specified range. This enables the customer to benefit if spot trades within a narrow range.

Range swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on the floating leg.

Example 1: Customer enters GBP range swap, receiving increased fixed payment if spot is rangebound.

Consider Cable (GBP/USD), spot rate at 1.50.
 Customer enters a 6 month GBP fixed / floating swap on GBP100mio.
 Customer pays 6 month GBP LIBOR.
 Customer receives 2% per annum plus 8% per annum if GBP/USD spot remains within 1.45 / 1.55 range throughout the next six months.

Customer then receives (or pays if negative) the difference between 6month GBP LIBOR on GBP100mio at the start of the contact and the fixed leg yield on GBP100mio for 6months.

No cash changes hands today.

At expiry, look at the highest spot level throughout the past 6 months (S_{\max}) and the lowest spot level over the past 6 months (S_{\min}).

$S_{\min} < 1.45$	S_{\min} is outside the range and the fixed leg yields 2% p.a. on GBP10mio.
$S_{\max} > 1.55$	S_{\max} is outside the range and the fixed leg yields 2% p.a. on GBP10mio.
Otherwise	Spot has stayed with the range and the fixed leg yields 10% p.a. on GBP10mio.

Example 2: Customer enters EUR range swap, receiving increased fixed payment if spot is range-bound.

Consider Cable (GBP/USD), spot rate at 1.50.
 Customer enters a 3 month EUR fixed / floating swap on EUR100mio.
 Customer pays 3 month EUR LIBOR.
 Customer receives 2% per annum plus 6% per annum if GBP/USD spot remains within 1.45 / 1.55 range throughout the next three months.

Customer then receives (or pays if negative) the difference between 3 month EUR LIBOR on EUR100mio at the start of the contact and the fixed leg yield on EUR100mio for 3months.

No cash changes hands today.

At expiry, we look at the highest spot level throughout the past 3 months (S_{\max}) and the lowest spot level over the past 3 months (S_{\min}).

$S_{\min} < 1.45$	S_{\min} is outside the range and the fixed leg yields 2% p.a. on EUR10mio.
$S_{\max} > 1.55$	S_{\max} is outside the range and the fixed leg yields 2% p.a. on EUR10mio.
Otherwise	Spot has stayed with the range and the fixed leg yields 8% p.a. on EUR10mio.

■ Advantages:

- 1) Customer benefits from a better rate if spot stays within their range.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) A swap is far less capital intensive than a deposit or a note.
- 4) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If FX rates move against the customer they receive a lower fixed coupon than a vanilla swap.

Range Accrual

A range accrual is a deposit whose coupon improves depending on the number of days spot stays within a range. This enables the customer to benefit if spot trades within a narrow range.

It can be structured as a note or swap as well, and is a simpler version of a day count swap.

Example 1: Customer deposits GBP 10mio

Consider Cable (GBP/USD), spot rate at 1.50.
Customer deposits GBP 10mio for 6 months at 0.50%pa plus 0.05%pa for each day that spot fixes within a 1.45 / 1.55 range.
We take 125 fixings from 1FED, over the next 125 business days.

Customer's yield depends on the number of days that spot fixes within the range

Customer deposits GBP10mio today.
For 125 days, we take spot fixings from 1FED.
Let n be the number of days that the GBP/USD spot fixing rate is between 1.45 and 1.55.
At expiry, customer receives yield of $0.50\% + 0.05\% * n$ per annum.
So, if $n = 0$, yield is 0.50% pa.
If $n = 50$, yield is 3.00% pa.
If $n = 100$, yield is 5.50% pa.
If $n = 125$, yield is 6.75% pa.

Example 2: Customer deposits EUR 100mio

Consider Cable (GBP/USD), spot rate at 1.50.
Customer deposits EUR10mio for 12 months at 1.00%pa plus 0.02%pa for each day that spot fixes within a 1.45 / 1.55 range.
We take 250 fixings from 1FED, over the next 250 business days.

Customer deposits EUR10mio today.
For 250 days, we take spot fixings from 1FED.
Let n be the number of days that the GBP/USD spot fixing rate is between 1.45 and 1.55.
At expiry, customer receives yield of $1.00\% + 0.02\% * n$ per annum.
So, if $n = 0$, yield is 1.00% pa.
If $n = 100$, yield is 3.00% pa.
If $n = 200$, yield is 5.00% pa.
If $n = 250$, yield is 6.00% pa.

■ Advantages:

- 1) Customer benefits from a better rate if spot stays within their range.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Can be tailored to match customer's views and needs.
- 4) The customer is selling implied volatility.

■ Disadvantages:

- 1) If FX rates move against the customer they receive a lower coupon than a vanilla deposit / note/ swap.

Inside/Outside Range Accrual

An inside/outside range accrual is a deposit whose coupon improves depending on the number of days spot stays within a range, and worsens depending on the number of days that spot spends outside the range. This enables the customer to benefit if spot trades within a narrow range.

It can be structured as a note or swap as well, and is a simpler version of a day count swap.

Example 1: Customer deposits GBP 10mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits GBP 10mio for 6 months at 0.50%pa.

For each day that spot fixes within a 1.45 / 1.55 range his rate improves by 0.10%.

For each day that spot fixes outside a 1.45 / 1.55 range his rate worsens by 0.10%, subject to the guarantee that the final rate is no worse than 0.50%.

We take 125 fixings from 1FED, over the next 125 business days.

Customer deposits GBP10mio today.

For 125 days, we take spot fixings from 1FED.

Let n be the number of days that the GBP/USD spot fixing rate is between 1.45 and 1.55.

At expiry, customer receives yield of $0.50\% + 0.10\% * n - 0.10\% * (250 - n)$ per annum, floored at 0.50%.

So, if $n = 0$, yield is 0.50% pa.

If $n = 50$, yield is 0.50% pa.

If $n = 100$, yield is 8% pa.

If $n = 125$, yield is 13% pa.

Example 2: Customer deposits EUR 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits EUR10mio for 12 months at 1.00%pa.

Each day that spot fixes within a 1.45 / 1.55 range, his rate improves by 0.03%.

Each day that spot fixes outside a 1.45 / 1.55 range, his rate worsens by 0.02%, subject to the guarantee that the final rate is no worse than 1.00%.

We take 250 fixings from 1FED, over the next 250 business days.

Customer deposits EUR10mio today.

For 250 days, we take spot fixings from 1FED.

Let n be the number of days that the GBP/USD spot fixing rate is between 1.45 and 1.55.

At expiry, customer receives yield of $1.00\% + 0.03\% * n - 0.02 * (250 - n)$ per annum, subject to the guarantee that the final rate is no worse than 1.00%.

So, if $n = 0$, yield is 1.00% pa.

If $n = 100$, yield is 1.00% pa.

If $n = 200$, yield is 6.00% pa.

If $n = 250$, yield is 8.50% pa.

■ Advantages:

- 1) Customer benefits from a better rate if spot stays within their range.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Customer achieves better gearing than for a regular range accrual.

Customer's yield depends on the number of days that spot fixes within the range. Customer can get penalized for each day spot fixes outside the range.

- 4) The customer is selling more implied volatility than for a range accrual.
- 5) Can be tailored to match customer's views and needs.

■ **Disadvantages:**

- 1) If FX rates move against the customer they receive a lower coupon than a vanilla deposit / note/ swap.
- 2) Customer is less likely to receive improved yield than for a regular range accrual.
- 3) It is possible that improvements in yield due to spot staying in the range at the start of the period can be eroded by spot breaking the range later in the period.

Participating Deposit

In a participating deposit, the customer's deposit earns a base rate worse than a vanilla deposit but, at expiry, they get to participate in any improvements in the base rate according to a pre-agreed percentage linked to movements in spot.

It can be structured as a note or swap as well.

Example 1: Customer deposits GBP 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits GBP 100mio for 6 months at 0.5% plus 75% participation in GBP's appreciation against USD subject to a cap of 7%.

Customer participates in 75% of the appreciation of GBP against USD, subject to a cap

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.50$	GBP has depreciated and customer earns 0.5% p.a. on GBP 100mio.
$1.50 < S_0 < 1.63$	GBP has appreciated and customer earns $[0.5 + 0.75 * (S_0 - 1.50) / 1.50]\%$ p.a. on GBP 100mio
$S_0 > 1.63$	GBP has appreciated beyond the cap and customer earns 7% p.a. on GBP 100mio.

Example 2: Customer deposits GBP 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits GBP 100mio for 6 months at 1.5% plus 50% participation in GBP's depreciation subject to a cap of 6%.

Customer participates in 50% of the depreciation of GBP against USD, subject to a cap

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.365$	GBP has depreciated beyond the cap and the customer earns 6% p.a. on GBP 100mio.
$1.365 < S_0 < 1.50$	GBP has depreciated and customer earns $[1.5 + 0.5 * (1.50 - S_0) / 1.50]\%$ p.a. on GBP 100mio
$S_0 > 1.50$	GBP has appreciated and customer earns 1.5% p.a. on GBP 100mio.

■ Advantages:

- 1) Customer benefits from a better rate if spot moves in the direction anticipated.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Can be tailored to match customer's views and needs.
- 4) The customer is buying implied volatility.

■ Disadvantages:

- 1) If rates move against the customer they receive a lower rate than a vanilla deposit / note/ swap.

Dual Currency Deposit

In a dual currency deposit, the customer earns a higher rate on their deposit but, at expiry, if spot has exceeded a pre-agreed trigger level then the deposit is returned in another currency at that trigger rate.

Example 1: Customer deposits GBP 100mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits GBP 100mio for 6 months at 8% with a 1.55 trigger.

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

- | | |
|--------------|--|
| $S_0 < 1.55$ | - GBP is below the trigger rate. Customer earns 8% p.a. and so receives GBP 104mio back on expiry. |
| $S_0 > 1.55$ | - GBP is above the trigger. Customer earns 8% p.a. and so receives USD 161.2mio back on expiry. |

Customer earns high rate of interest, but may receive their principal in another currency. If so, the conversion rate will be better than available in the market today.

Example 2: Customer deposits USD 150mio

Consider Cable (GBP/USD), spot rate at 1.50.

Customer deposits USD 150mio for 6 months at 7% with a 1.43 trigger

Customer pays nil premium today.

At expiry, GBP/USD spot rate (S_0):

- | | |
|--------------|---|
| $S_0 < 1.43$ | - GBP is below the trigger. Customer earns 7% p.a. and so receives GBP 108.6mio back on expiry. |
| $S_0 > 1.43$ | - GBP is above the trigger. Customer earns 7% p.a. and receives USD 155.25mio back on expiry. |

■ Advantages:

- 1) Customer benefits from a better rate if spot does not move too far against the customer's expectations.
- 2) Enables customer to take a view on spot rates without being exposed to currency movements on the notional principal.
- 3) Dual currency deposits often offer significant yield improvements to customers.
- 4) Can be tailored to match customer's views and needs.
- 5) The customer is selling implied volatility.

■ Disadvantages:

- 1) If spot moves against the customer they receive back a different currency than their deposit, at an out the money rate, i.e. the principal is not protected in the original currency terms

Cancelable Currency Swap

In a cancelable currency swap, two counterparties enter a swap for an initial exchange of nominal principal, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principal at the initial rate. One of the two counterparties has the option of canceling the remaining legs of the contract after a pre-agreed period of time.

Cancelable currency swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example 1: Customer enters GBP 100mio GBP/USD cancelable swap.

Consider Cable (GBP/USD), spot rate at 1.50.
Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50, paying GBP Libor, receiving USD Libor - 0.3%. Customer has the option to cancel on each payment day from 2 years.

The fact that one counterparty can cancel the swap enables the other counterparty to achieve a much higher yield in the meantime

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio and receives USD 150mio.

For the first 2 years the customer pays GBP LIBOR on GBP100mio and receives USD LIBOR - 0.3% on USD 150mio, semi-annual.

After 2 years, the customer can decide to cancel all remaining cash flows, including the final exchange of notional principal. If the customer does not cancel the swap, then after 2 years and 6 months the customer pays GBP Libor and receives USD Libor - 0.3% and they again have the right to cancel all remaining cash flows.

If after 5 years the swap has not been cancelled, the final interest payments are made and the principals exchanged.

Example 2: Customer enters GBP 100mio GBP/USD cancelable swap

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD Libor + 0.3% with Merrill Lynch having the option to cancel on each payment day from 2 years.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio and receives USD 150mio.

For the first 2 years the customer pays GBP LIBOR on GBP100mio and receives USD LIBOR + 0.3% on USD 150mio, semi-annual.

After 2 years, Merrill Lynch can decide to cancel all remaining cash flows, including the final exchange of notional principal. If Merrill Lynch does not cancel the swap, then after 2 years and 6 months the customer pays GBP Libor and receives USD Libor + 0.3% and Merrill Lynch again has the right to cancel all remaining cash flows.

If after 5 years the swap has not been cancelled, the final interest payments are made and the principals exchanged.

■ Advantages:

- 1) If the customer sells the option to cancel they receive a higher coupon than for a vanilla swap.
- 2) If the customer buys the option to cancel, this gives them a degree of

flexibility to cancel the swap should their situation change or rates move in their favour.

- 3) Can be tailored to match customer's views and needs.

■ **Disadvantages:**

- 1) If the customer buys the option to cancel, the coupon received is lower than for a vanilla swap.
- 2) If Merrill Lynch cancels the swap, the customer is left with the wrong currency and an exposed position.

Callable Currency Swap

In a callable currency swap, two counterparties enter a swap for an initial exchange of nominal principal, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principal at the initial rate. One counterparty has the option of calling the swap, in which case we cancel all future coupon cash flows and exchange notional at time of exercise instead of the final maturity.

Callable currency swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example 1: Customer enters GBP 100mio GBP/USD callable swap

The fact that one counterparty can call the swap enables the other counterparty to achieve a much higher yield in the meantime

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD Libor – 0.5% with the option to call on each payment day from 2 years.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio and receives USD 150mio.

For the first 2 years the customer pays GBP Libor and receives USD Libor – 0.5% on GBP 100mio.

After 2 years, the customer can call the swap, canceling all future cash flows and receiving back GBP 100mio for USD 150mio. If the customer does not call the swap, in 6 months time he will pay GBP Libor and receives USD Libor – 0.5% on GBP 100mio, and again has the option to call the swap.

After 5 years, if the customer has not yet called the swap, the final interest payments are made and the principals exchanged.

Example 2: Customer buys GBP 100mio GBP/USD swap

Consider Cable (GBP/USD), spot rate at 1.50.

Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD Libor + 0.5% with Merrill Lynch having the option to call on each payment day from 2 years.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio and receives USD 150mio.

For the first 2 years the customer pays GBP Libor and receives USD Libor + 0.5% on GBP 100mio.

After 2 years, Merrill Lynch can call the swap, canceling all future cash flows and paying GBP 100mio for USD 150mio. If Merrill Lynch does not call the swap, in 6 months time the customer will pay GBP Libor and receive USD Libor + 0.5% on GBP 100mio, and again Merrill Lynch has the option to call the swap.

After 5 years, if Merrill Lynch has not yet called the swap, the final interest payments are made and the principals exchanged.

■ Advantages:

- 1) If the customer sells the option to call they receive a higher coupon than for a vanilla swap.

- 2) If the customer has the right to call the swap, they have a degree of flexibility to call the swap should their situation change or rates move in their favour.
- 3) Can be tailored to match customer's views and needs.

■ **Disadvantages:**

- 1) If the customer buys the option to call, the coupon received is lower than for a vanilla swap.
- 2) If Merrill Lynch calls the swap, the customer may have to re hedge their future cash flows.

Flippable Swap

In a flippable swap, two counterparties enter a swap for an initial exchange of nominal principal, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principal at the initial rate. One counterparty has the option of flipping one leg of the swap into a different currency and/or different payment regime after a pre-agreed period of time.

Flippable swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example 1: Customer buys GBP 100mio GBP/USD swap

The fact that one counterparty can flip the swap enables the other counterparty to achieve a higher yield in the meantime

Consider Cable (GBP/USD), spot rate at 1.50 and GBP/JPY spot rate at 180. Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD Libor + 0.5%, with the option to swap out of USD into JPY paying GBP Libor, receiving JPY Libor + 2% after 2 years, at a GBP/JPY rate of 180.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio for USD 150mio.

For the first 2 years the customer pays GBP Libor and receives USD Libor + 1.5% on GBP 100mio.

In 2 years and 6 months time the customer can pay the GBP Libor and receive USD Libor + 0.5% or flip the USD into JPY, receiving JPY Libor + 3%. At expiry, the customer receives back the GBP 100mio for JPY 18bn. If the customer has not flipped the swap on this payment day they retain the option to do so on all following payment days.

After 5 years, if the customer has not yet flipped the swap, the final interest payments are made and the original principals of GBP100mio and USD150mio are exchanged.

Example 2: Customer buys GBP 100mio GBP/USD swap

Consider Cable (GBP/USD), spot rate at 1.50 and GBP/JPY spot rate at 180. Customer buys GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD Libor + 1.5% with Merrill Lynch having the option to swap from USD into JPY paying GBP Libor, receiving JPY Libor + 3% after 2 years at a GBP/JPY rate of 180.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio for USD 150mio.

For the first 2 years the customer pays GBP Libor and receives USD Libor + 1.5% on GBP 100mio.

In 2 years and 6 months time Merrill Lynch can receive USD Libor + 1.5% and pay GBP Libor or flip the USD into JPY, paying JPY Libor + 3%. At expiry, the customer receives back the GBP 100mio for JPY 18bn. If Merrill Lynch has not flipped the swap on this payment day they retain the option to do so on all following payment days.

After 5 years, if the Merrill Lynch has not yet flipped the swap, the final interest payments are made and the original principals of GBP100mio and USD150mio are exchanged.

■ Advantages:

- 1) If the customer buys the right to flip, they get a degree of flexibility to change currencies should their situation change or currencies move in their favour.
- 2) If the customer sells the right, they receive a higher coupon than for a vanilla.
- 3) If the customer sells the right and is flipped, they will normally be flipped into a rate which is better than the market rate that was prevalent at the start of the swap.
- 4) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If the customer buys the right to flip they receive a lower coupon than for a vanilla swap.
- 2) If Merrill Lynch flips the swap, the customer may need to re hedge their currency position at historically unfavourable rates.

Participating Swap

In a participating swap, the customer enters a swap for an initial exchange of nominal principal, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principal at a final rate. The final rate will depend on the spot rate at expiry by a predetermined relationship.

Participating swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example: Customer enters GBP 100mio GBP/USD participating swap

Consider Cable (GBP/USD), spot rate at 1.50
Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor receiving USD Libor + 1%.
The final exchange rate will be at 1.50, unless spot is below 1.50.
If spot is between 1.35 and 1.50, the final exchange will be at the prevailing spot rate.
If spot is below 1.35, the final exchange will be at 1.35.

Customer pays nil premium today.
On day 1, the customer sells GBP 100mio for USD 150mio.
During the 5 years, the customer pays GBP Libor receiving USD Libor + 1%.

At expiry, GBP/USD spot rate (S_0):

$S_0 < 1.35$	- The customer buys GBP 100mio and sells USD135mio.
$1.35 < S_0 < 1.50$	- The customer buys GBP 100mio and sells USD100mio * S_0
$S_0 > 1.50$	- The customer buys GBP 100mio and sells USD150mio.

■ Advantages:

- 1) The customer may receive a higher coupon than for a vanilla swap.
- 2) His product is far less credit intensive than a regular swap, because of the cap on the participation.
- 3) The customer can take advantage of rates moving in their favour.
- 4) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) Customer has downside if rates move significantly against them.

Power Reverse Dual

A power reverse dual is a callable swap where one side of the coupon is linked to the underlying spot rate.

Example 1: Customer enters GBP 100mio GBP/USD power reverse dual

Consider Cable (GBP/USD), spot rate at 1.50
 Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving $\{\max[30\% * S_0/1.50 - 26\%, 0]\}$ capped at 8% calculated on each payment date, with Merrill Lynch having the option to call on each payment day after 2 years.

Customer pays nil premium today.

On each payment date, GBP/USD spot rate (S_0):

$S_0 < 1.30$	The customer pays GBP Libor and receives 0%.
$1.30 < S_0 < 1.70$	The customer pays GBP Libor and receives $[30\% * S_0/1.50 - 26\%]$.

$S_0 > 1.70$	The customer pays GBP Libor and receives 8%.
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In 2 years and 6 months time Merrill Lynch can either continue with the swap or call it, paying the customer GBP 100mio for USD 150mio and canceling all future exchanges. If Merrill Lynch has not called the swap on this payment day they retain the option to do so in all following payment days.

After 5 years, if the customer has not yet called the swap, the final interest payments are made and the original principals of GBP100mio and USD150mio are exchanged.

Example 2: Customer enters GBP 100mio GBP/USD power reverse dual

Consider Cable (GBP/USD), spot rate at 1.50
 Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying $\{\max[30\% * S_0/1.50 - 26\%, 1\%]\}$ capped at 8% calculated on each payment date, receiving USD Libor, with Merrill Lynch having the option to call on each payment day after 2 years.

Customer pays nil premium today.

On each payment date, GBP/USD spot rate (S_0):

$S_0 < 1.35$	The customer pays 1% and receives USD Libor.
$1.35 < S_0 < 1.70$	The customer pays $[30\% * S_0/1.50 - 26\%]$ and receives USD Libor.

$S_0 > 1.70$	The customer pays 8% and receives USD Libor.
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In 2 years and 6 months time Merrill Lynch can either continue with the swap or call it, paying the customer GBP 100mio for USD 150mio and canceling all future exchanges. If Merrill Lynch has not called the swap on this payment day they retain the option to do so in all following payment days.

After 5 years, if Merrill Lynch has not yet called the swap, the final interest payments are made and the original principals of GBP100mio and USD150mio are exchanged

■ Advantages:

- 1) The customer can take advantage of spot rates moving in their favour by paying a lower coupon or receiving a higher coupon.
- 2) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) Customer has downside if rates move against them by receiving a lower coupon or paying a higher coupon.

Cross currency Swap with Delayed Knock-out

In a cross currency swap with delayed knock-out, two counterparties enter a swap with initial exchange of nominal principals, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principals at maturity. One of the counterparties may cancel the final exchange of principals unless a knock-out has occurred. A knock-out occurs if, after a pre-agreed delay period, the spot rate trades at or beyond a predetermined level.

Cross currency swaps with delayed knock-out can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example: Customer enters GBP100mio GBP/USD swap with delayed knock-out.

Consider Cable (GBP/USD), spot rate at 1.50
Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD LIBOR + 1.5%. Merrill Lynch can cancel final exchange of principals unless GBP/USD trades at or above 1.45 at any time between 6 months and 5 years hence.

On day 1, customer sells GBP100mio and receives USD150mio.

Every 6 months, interest payments are made.

If, at any time from 6 months to 5 year, the Cable spot rate has traded at or above 1.4500, then at expiry, the customer buys GBP100mio and pays USD150mio.

If, at no time from 6 months to 5 year, the Cable spot rate has traded above 1.4500, then at expiry, Merrill Lynch may choose to cancel the final exchange.

■ **Advantages:**

- 1) The customer receives a higher coupon than from a vanilla swap.
- 2) Can be tailored to match customer's views and needs.
- 3) The risk of having the final exchange cancelled will be knocked out if spot trades above a level which is very favourable compared to present spot rates.

■ **Disadvantages:**

- 1) The customer receives a slightly lower coupon than they would do for the comparable cancelable swap without knock-out.
- 2) If rates move against the customer then the customer could see the swap knocked-out, losing the higher coupon.
- 3) If the swap does not knock-out and the option is in the money, then the customer is exposed to the exchange rate of the option currency pair.

Cross Currency Swap with last day Knock-in

In a cross currency swap with last day knock-in, two counterparties enter a swap with initial exchange of nominal principals, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principals at maturity. One of the counterparties may cancel the final exchange of principals if on the last day the spot rate is beyond a particular level.

It can also have a continuous or delayed knock-out, so that the final exchange can only be cancelled if the spot rate is beyond a particular level on that day AND hasn't traded beyond the knock-out level during the knock-out monitoring period.

Cross currency swaps with last day knock-in can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example: Customer enters GBP100mio GBP/USD swap with last day knock-in.

Consider Cable (GBP/USD), spot rate at 1.50
Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving USD LIBOR + 1.5%. Merrill Lynch can cancel final exchange of principals if GBP/USD trades at or above 1.60 at expiry.

On day 1, customer sells GBP100mio and receives USD150mio.

Every 6 months, interest payments are made.

If at expiry the Cable spot rate is below 1.60, the customer buys GBP100mio and pays USD150mio.

If at expiry the Cable spot rate is above 1.60, Merrill Lynch may cancel the final exchange.

■ Advantages:

- 1) The customer receives a higher coupon than from a vanilla swap.
- 2) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) The customer will not know their currency exposure for certain until the last day of the swap.
- 2) The customer could end up having to re-hedge at historically unfavourable rates.

Daycount Swap

In a daycount swap, two counterparties enter a swap with initial exchange of nominal principals, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principals at maturity. One side of the coupon is dependent on the number of daily fixings of the exchange rate during each payment interval.

Daycount swaps can be callable or cancelable as well.

Daycount swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example: Customer enters GBP 100mio GBP/USD daycount swap

Usually the final exchange is guaranteed, but the coupon will depend upon market parameters in the period prior to each payment date during the life of the swap

Consider Cable (GBP/USD), spot rate at 1.50

Customer enter GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving $\{2\% + 5\% * n/125\}$ where n is the number of days over the last 125 days of each 6 month period that spot fixings off 1FED fixed above 1.50.

Customer pays nil premium today.

On day 1, the customer sells GBP 100mio for USD 150mio.

If, for example, on the first payment date 75 of the fixings were above 1.50 then the customer would pay GBP Libor and receive $\{2\% + 5\% * 75/125\} = 5\%$. This calculation is conducted on every payment date until expiry at which point the customer buys GBP 100mio for USD 150mio.

■ Advantages:

- 1) The customer receives a higher coupon than from a vanilla swap if rates move in their favour.
- 2) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If rates move against the customer then the customer will receive a lower coupon than from a vanilla swap.

European Digital Swap

In a European Digital swap, two counterparties enter a swap for an initial exchange of nominal principal, then a series of exchanges at a fixed rate, followed by an exchange of the nominal principal at the initial rate. One side of the coupon is fixed according to whether the spot rate is at or beyond a strike level on a specified day during each payment period.

European digital swaps can be callable or cancelable as well.

European digital swaps can also be structured as floating against floating, with a fixed improvement on one leg, or as fixed against floating, with a fixed improvement on one of the legs.

Example: Customer enters GBP 100mio GBP/USD European Digital swap

Consider Cable (GBP/USD), spot rate at 1.50
Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor, receiving 6% if spot trades above 1.50 5 business days before each coupon, otherwise 0%.

Initially, the customer sells GBP 100mio for USD 150mio.
During the 5 years, 5 business days before each payment date, if spot is above 1.50 the customer pays GBP Libor and receives 6%, whereas if spot is below 1.50 the customer pays GBP Libor and receives 0%. At expiry, the customer buys GBP 100mio for USD 150mio.

Usually the final exchange is guaranteed, but the coupon will depend upon market parameters on the payment dates during the life of the swap

■ Advantages:

- 1) The customer receives a higher coupon than from a vanilla swap if rates move in their favour.
- 2) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If rates move against the customer then the customer will receive a lower coupon than from a vanilla swap.

Knock-out Caps

In a Knock-out cap, the customer enters a swap for an initial exchange of nominal principal, then a series of exchanges at a floating rate, followed by an exchange of the nominal principal at the initial rate. The rate the customer receives is capped at a pre-agreed amount. The cap can be knocked-out if the spot rate trades above a trigger level.

Knock-out caps can also be structured as fixed against floating, with a cap on the floating leg.

Example: Customer enters GBP 100mio GBP/USD knock-out cap

Consider Cable (GBP/USD), spot rate at 1.50

Customer enters GBP100mio semi-annual 5 year GBP/USD swap at 1.50 paying GBP Libor – 0.2%, receiving USD Libor capped at 5% with the cap having a knock-out at 1.60.

Initially the customer sells GBP 100mio for USD 150mio.

On each coupon payment date, we look at S_{\max} , the highest level of GBP/USD spot rate between the start of the trade and the coupon payment date.

$S_{\max} < 1.60$

The cap has not knocked out, therefore the customer pays GBP Libor – 0.2% and receives USD Libor capped at 5%.

$S_{\min} > 1.60$

The cap has knocked out, therefore the customer pays GBP Libor – 0.2% and receives USD Libor.

At expiry, the customer buys GBP 100mio for USD 150mio.

■ Advantages:

- 1) The customer receives a higher coupon than from a vanilla swap if rates move in their favour.
- 2) Can be tailored to match customer's views and needs.

■ Disadvantages:

- 1) If rates move against the customer then the customer will receive a lower coupon than from a vanilla swap.