

CAPS/FLOORS/COLLARS VALUATION AND STRATEGIES EXPLAINED

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Version: 1.00

DEFINITIONS

A cap

Is an option strategy that protects the borrower under a floating rate note from a rise in interest rates, whilst allowing the enjoyment of falling interest rates.

Although single-period caps are available, caps generally cover a series of reset dates; consequently a cap is made of a series of individual options, known as **caplets**.

The sum of the cost of these individual protections represents the cap premium.

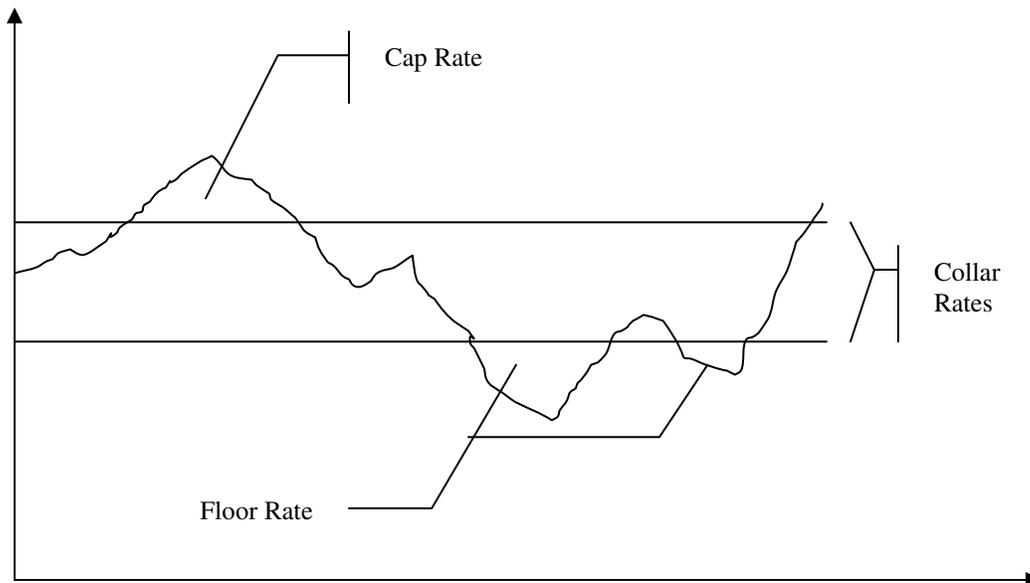
A floor

Is an option strategy that protects the investor in a floating rate instrument from a fall in interest rates at the time when the floating coupon is being reset, whilst allowing the enjoyment of rising interest rates.

As for caps a floor is made of a series of individual options, known as **floorlets**.

A collar

Is a combination of a cap and a floor. It entails the purchase of the first option and the sale of the second. The advantage of such a strategy is the lower cost compared to caps and floors.



Above: the effect of a cap, a floor and a collar on LIBOR rates.

BLOOMBERG SOLUTION

Via our swap manager (**SWPM <GO>**) or the directly through (**SWPM -CAP<GO>**) you will access our calculator.

The screenshot displays the Bloomberg SWPM (Swap Manager) interface. At the top, it shows navigation options like '<HELP>' and '<MENU>', and the current deal identifier 'P107 Govt SWPM'. Below this is a menu bar with 'Options', 'New Deal', 'Save Deal', 'View', and 'Vol. Defaults'. The main configuration area is titled 'SWAP MANAGER' and includes fields for 'Deal', 'Counterparty' (CAP CNTRPARTY), 'Ticker' (/CAP), 'Series', and 'Deal #'. The 'Type' is set to 'Cap'. Key parameters include: Notional (10 MM), Currency (EUR), Effective date (07/27/05), Maturity (01/27/10), Cap Strike (3.04758 % Rcv), Day Count (ACT/360), and Bus Day Adj (ModifiedFollowing). The 'Index' is EUR006M with a Latest Index of 2.33397. The 'Reset/Pay Freq' is SemiAnnual. The 'Discount Curve' and 'Forward Curve' are both set to 45 Bid New Euro Currency, and the 'Volatility Curve' is EUR Caps/Floors. The 'Valuation' section shows the Curve as 01/25/05 and the Valuation date as 01/27/05, with All Values in EUR. The Market Value is 188,935.93. Other metrics include Delta (Hedge) at 0.50106, Gamma (10bps) at 0.03305, Vega (1%) at 6,990.69, and Theta (1-day) at -83.14. The 'Calculate' dropdown is set to 'Premium', resulting in a Premium of 1.88936 and an Implied Volatility of 21.71961. A 'Refresh' button is located at the bottom right of the valuation section. At the very bottom, there is a 'Main' menu with regional codes and a copyright notice: 'Copyright 2005 Bloomberg L.P. 6452-764-1 25-Jan-05 12:14:23'.

The calculator allows you to build a highly customizable floating rate leg and price caps, floors collars and other option strategies off this leg.

You can solve for:

- 1) **premium** of options and strategies
- 2) **strike** price for caps and floors and multiple strikes for strategies
- 3) **implied volatility**

You also can:

- 1) save your option
- 2) send it to your counterparty
- 3) retrieve it in the future and mark it to market.

1) Step: Build a Cap

<HELP> for explanation, <MENU> for similar functions. P107 Govt SWPM

Options | New Deal | Save Deal | View | Vol. Defaults | SWAP MANAGER

Deal Counterparty CAP CNTRPARTY Ticker / CAP Series Deal #

Type Cap

Notional 10 MM Index EUR006M

Currency EUR Latest Index 2.33397

Effective 07/27/05 0 YR x 5 YR Reset/Pay Freq SemiAnnual

Maturity 01/27/10

Cap Strike 3.04758 % Rcv

Day Count ACT 360 Discount Curve 45 Bid New Euro Currency

Bus Day Adj ModifiedFollowing Forward Curve 45 Bid New Euro Currency

Volatility Curve EUR Caps/Floors

Valuation Curve 01/25/05 Valuation 01/27/05 All Values in EUR

Market Value 188,935.93 Delta (Hedge) 0.50106 ATM Strike 3.04758

Calculate Premium Gamma (10bps) 0.03305 DV01 -2,009.88

Premium 1.88936 Vega (1%) 6,990.69 Yield Value 44.87

Implied Volatility 21.71961 Theta (1-day) -83.14 Refresh

Main Curves Volatility Valuation Hist. Cashflow

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410

Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P. 6452-764-1 25-Jan-05 12:14:23

The Main Menu of your portfolio manager will enable you to set up easily your deal:

- type of deal
- strike price
- contract details
- volatility
- effective date (Current or Forward)

<HELP> for explanation. P107 Govt SWPM

Options | New Deal | Save Deal | View | Vol. Defaults | SWAP MANAGER

Deal Counterparty CAP CNTRPARTY Ticker / CAP Series Deal #

AmortSchedule Type Rollercoaster Amount Amount Security Amort Lookup

Amort Dates(Rov)	Amort Rates(Rov)	Amort Dates(Rov)	Amort Rates(Rov)	Amort Dates(Rov)	Amort Rates(Rov)
01/27/06	1000000.000000				
07/27/06	1000000.000000				
01/29/07	-500000.000000				
07/27/07	1000000.000000				
01/28/08	-200000.000000				
07/28/08	1000000.000000				
01/27/09	1000000.000000				
07/27/09	1000000.000000				

Clear Schedule

NOTE: Amortization between payment dates will be applied on the next payment date.

Edit Deal Reset Amortization Custom

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410

Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P. 6452-764-1 25-Jan-05 12:34:08

Any amortization features to the initial notional amount can be added. The amortization dates can be also customized.

<HELP> for explanation.

P107Msg:CAROL TENG

Options | New Deal | Save Deal | View | Vol. Defaults | SWAP MANAGER

Deal | Counterparty CAP_CNTRPARTY | Ticker / CAP | Series | Deal# |

Cap Custom

Expiry	Start Date	End Date	Payment Date	Reset Rate	Cap Strike
07/25/05	07/27/05	01/27/06	01/27/06	2.33397	3.04758
01/25/06	01/27/06	07/27/06	07/27/06	2.56802	3.04758
07/25/06	07/27/06	01/29/07	01/29/07	2.77150	3.04758
01/25/07	01/29/07	07/27/07	07/27/07	2.94896	3.04758
07/25/07	07/27/07	01/28/08	01/28/08	3.12535	3.04758
01/24/08	01/28/08	07/28/08	07/28/08	3.25548	3.04758
07/24/08	07/28/08	01/27/09	01/27/09	3.40612	3.04758
01/23/09	01/27/09	07/27/09	07/27/09	3.52402	3.04758
07/23/09	07/27/09	01/27/10	01/27/10	3.65395	3.04758

Edit Deal | Reset | Amortization | Custom

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The flexibility of the set up is extended to:

- end and payment dates
- reset rates
- Cap strikes.

Therefore, for instance, you can structure a step-up strike feature.

2) Step: customize volatility

Cap and floors volatility can be customized:

<HELP> for explanation, <MENU> for similar functions. P218 Govt SWYV
Enter # <Go> to access a specific country

Volatility Default Settings

COUNTRY	Cap Flr	Swap-tion	COUNTRY	Cap Flr	Swap-tion	COUNTRY	Cap Flr	Swap-tion
1*Australia	2	3	11 Ireland	4	6	21*Switzerland	1	1
2 Austria	1	1	12 Italy	2	1	22*UK	2	2
3 Belgium	1	1	13*Japan	2	1	23*United States	2	2
4 Canada	1	1	14 Netherlands	1	1	24*South Korea	2	2
5*Denmark	1	1	15 New Zealand	5	1	45*Euro	2	2
6 E.C.U.	1	1	16*Norway	1	1			
7 Finland	1	1	17 Portugal	1	1			
8 France	1	1	18 South Africa	1	1			
9 Germany	1	1	19 Spain	1	1			
10*Hong Kong	2	3	20*Sweden	1	1			

* Contributed volatility available

SOURCE:

1: Historical volatility vector	USER SUPPLIED:
CONTRIBUTED:	4: Volatility vector
2: Cap/floor/collar implied	5: Cap/floor/collar implied
3: Swaption implied	6: Swaption implied

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
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For the main currencies you can select your preferential contributor of volatility for caps and floors.
From SWYV <go>

<HELP> for explanation. P107 Govt SWPM

Options New Deal Save Deal View Vol. Defaults SWAP MANAGER

Deal	Counterparty	CAP	CNTRPARTY	Title	CAP	Series	Deal#								
Volatility Smile															
Term	ATM Strike	ATM Vol	1.8% Vol	2.0% Vol	2.2% Vol	2.5% Vol	3.0% Vol	3.0% Vol	3.5% Vol	4.0% Vol	5.0% Vol	6.0% Vol	7.0% Vol	8.0% Vol	10.0% Vol
1 YR	2.334	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850	16.850
2 YR	2.557	21.950	21.696	21.263	21.266	21.795	22.310	22.309	22.010	21.430	20.196	18.960	17.723	16.487	10.000
3 YR	2.743	22.360	22.351	21.997	21.919	22.185	22.447	22.461	22.397	22.341	22.429	22.592	22.713	22.795	22.918
4 YR	2.904	22.220	22.397	22.121	22.021	22.154	22.232	22.235	22.220	22.226	22.368	22.557	22.746	22.937	23.340
5 YR	3.048	21.720	21.898	21.745	21.679	21.758	21.728	21.720	21.702	21.716	21.871	22.100	22.366	22.664	23.326
7 YR	3.299	20.610	20.479	20.551	20.596	20.673	20.634	20.627	20.594	20.589	20.711	20.935	21.223	21.554	22.296
10 YR	3.578	19.100	18.525	18.802	18.972	19.082	19.087	19.085	19.085	19.077	19.148	19.337	19.604	19.922	20.651

Valuation Curve 01/25/05 Valuation 01/27/05 All Values in EUR

Market Value	188,935.93	Delta (Hedge)	0.50106	ATM Strike	3.04758
Premium	1.88936	Gamma (10bps)	0.03305	DV01	-2,009.88
Implied Volatility	21.71961	Vega (1%)	6,990.69	Yield Value	44.87
		Theta (1-day)	-83.14		

Main Curves Volatility Valuation Hist. Cashflow

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Through contributed prices the whole volatility matrix (expiry of options against option strike) is populated.

<HELP> for explanation.

P107 Govt SWPM

Save Defaults SWAP MANAGER

Volatility Defaults

Currency: EUR Caps/Floors: Pick Up (%): + 1.00 Give Up (%): - 1.00

TERM	ATM Strike	ATM Vol	ATM+1.00% Spread(%)	ATM-1.00% Spread(%)
1 YR	2.334	16.850	0.000	0.000
2 YR	2.599	21.950	0.000	0.000
3 YR	2.786	22.360	0.000	0.000
4 YR	2.944	22.220	0.000	0.000
5 YR	3.087	21.720	0.000	0.000
7 YR	3.335	20.610	0.000	0.000
10 YR	3.614	19.100	0.000	0.000

Refresh Menu

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P.
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In case you want to price of a fully customized curve or you are interested in pricing off the volatility at strike, you can input arbitrary levels of volatility give up and pickup.

3) Step: Sensitivities and Caplet PV's

From the "Valuation" page:

SWAP MANAGER										
Options New Deal Save Deal View Vol. Defaults										
Deal	Counterparty	Ticker	Series	Deal #						
Cap	CAP CNTRPARTY	/ CAP		EXPORT TO EXCEL						
Expiry	Notional	Cap Strike	Reset Rates	Wls	Pay Dates	Discount	Delta	Intrinsic PV	Premium	
04/26/2005	10000000.00	4.07180	3.11408	15.19	07/28/2005	0.98554	0.00021	0.00	0.00000	
07/26/2005	10000000.00	4.07180	3.33714	15.19	10/28/2005	0.97720	0.03561	0.00	0.00121	
10/26/2005	10000000.00	4.07180	3.54028	15.19	01/30/2006	0.96825	0.15974	0.00	0.00935	
01/26/2006	10000000.00	4.07180	3.60930	22.84	04/28/2006	0.95979	0.34055	0.00	0.03906	
04/26/2006	10000000.00	4.07180	3.77083	22.84	07/28/2006	0.95072	0.43189	0.00	0.06416	
07/26/2006	10000000.00	4.07180	3.93292	22.84	10/30/2006	0.94106	0.50670	0.00	0.09358	
10/26/2006	10000000.00	4.07180	4.08861	22.84	01/29/2007	0.93143	0.56568	395.76	0.11790	
01/25/2007	10000000.00	4.07180	3.99185	24.85	04/30/2007	0.92213	0.54794	0.00	0.12263	
04/26/2007	10000000.00	4.07180	4.08679	24.85	07/30/2007	0.91270	0.57814	345.81	0.14159	
07/26/2007	10000000.00	4.07180	4.17845	24.85	10/29/2007	0.90318	0.60370	2434.70	0.15991	
10/25/2007	10000000.00	4.07180	4.26682	24.85	01/28/2008	0.89352	0.62554	4404.80	0.17751	
01/24/2008	10000000.00	4.07180	4.26039	24.51	04/28/2008	0.88402	0.62322	3990.69	0.17785	
04/24/2008	10000000.00	4.07180	4.31904	24.51	07/28/2008	0.87448	0.63863	5465.15	0.19174	
Total							0.50202	79004.81	2.66645	

You can decompose the cap premium into its caplets; estimate every single caplet's discounted value and forward value. Finally you can appreciate what intrinsic and time values are associated to any caplet.

Delta	Gamma	Vega	Theta
0.00021	0.00033	0.45	-0.02
0.03561	0.02193	51.32	-1.92
0.15974	0.05209	195.44	-5.22
0.34055	0.04429	313.48	-9.68
0.43189	0.04069	400.23	-9.94
0.50670	0.03612	473.81	-9.82
0.56568	0.03170	503.26	-8.92
0.54794	0.02809	523.40	-8.83
0.57814	0.02555	555.69	-8.34
0.60370	0.02335	583.76	-7.88
0.62554	0.02144	608.40	-7.46
0.62322	0.02094	627.45	-6.96
0.63863	0.01953	647.61	-6.63
0.50202	0.02486	9723.23	-124.18

Caplets will also have different sensitivities. For instance if the underlying swap curve is upward sloping, caplet deltas will generally constantly increase. It's easy to compare the time decay for near-to-expiry caplets to their time value.

Other Option Strategies

The calculator is not limited to the pricing of caps, floors and collars but can handle more sophisticated strategies:

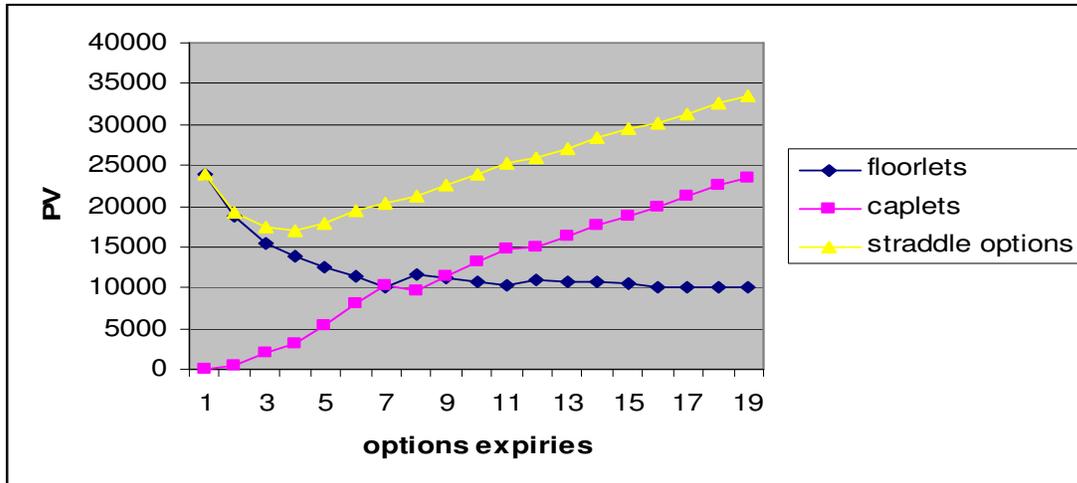
- **Cap Spreads**: the long position in a lower strike cap A is partially offset by a short position in another cap usually struck at a higher rate B. The rationale behind this trade is to limit the protection to rising interest rates only for the range between A and B. SWPM also allows the user to choose the premium that is willing to pay and find consequently one of the two strikes.

Type	Cap Spread	
Notional	10	MM
Currency	USD	
Effective	04/28/05	0 YR × 5 YR
Maturity	01/28/10	
Cap A Strike	4.07180	% Rcv × 1
Cap B Strike	4.83551	% Pay × 1
Day Count	ACT	360
Bus Day Adj	ModifiedFollowing	
Valuation	Curve	01/26/05
Market Value	100,000.00	
Calculate	Cap B Strike	
Premium	1.00000	
Flat Vol	20.00000	

- **Floor Spreads**: this strategy is simply the reciprocal of a Cap Spread.

<HELP> for explanation.		N248 Index SWPM	
Options New Deal Save Deal View Vol. Defaults SWAP MANAGER			
Deal	Counterparty	Ticker	Series
	CAP_CNTRPARTY	/CAP	
Type	Floor Spread		
Notional	10	MM	
Currency	EUR		
Effective	07/31/05	0 YR × 5 YR	
Maturity	01/31/10		
Floor A Strike	3.16316	% Rcv × 1	
Floor B Strike	3.00000	% Pay × 1	
Day Count	ACT	360	
Bus Day Adj	ModifiedFollowing		
Valuation	Curve	01/27/05	Valuation 01/31/05
Market Value	39,833.43		
Calculate	Premium		
Premium	0.39833		
Flat Vol			
Index	EUR006M		
Latest Index	2,40321		
Reset/Pay Freq	SemiAnnual		
Discount Curve	45 Bid	New Euro Currency	
Forward Curve	45 Bid	New Euro Currency	
Volatility Curve	EUR Caps/Floors		
Delta (Hedge)	-0.05452	ATM Strike	3.16316
Gamma (10bps)	-0.00157	DV01	249.05
Vega (1%)	269.06	Yield Value	9.49
Theta (1-day)	0.50		Refresh
Main Curves Volatility Valuation Hist. Cashflow			
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 320410 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P. 0 27-Jan-05 11:03:52			

- **Straddle**: if you are confident that the curve will shift abruptly and volatility will increase but you're not sure on which direction the curve is going to shift, that could be a favorable scenario to enter a Straddle. This strategy entails the purchase of a Cap and a Floor both struck at-the-money.



Above, the payoff of an IRS Straddle obtained through the excel download from SWPM.

<HELP> for explanation. N248 Index SWPM

Options | New Deal | Save Deal | View | Vol. Defaults | SWAP MANAGER

Deal	Counterparty	CAP_CNTRPARTY	Ticker	/CAP	Series		Deal #	
Type	Straddle							DETAIL
Notional	10	MM	Index	EUR006M				DETAIL
Currency	EUR	Latest Index	2.40321					
Effective	07/31/05	0 YR	x 5 YR	Reset/Pay Freq	SemiAnnual			
Maturity	01/31/10	Cap Strike	3.16316 % Rcv x 1	Discount Curve	45 Bid	New Euro Currency		
Floor Strike	3.16316 % Rcv x 1	Forward Curve	45 Bid	New Euro Currency				
Day Count	ACT	360	Volatility Curve	EUR				
Bus Day Adj	ModifiedFollowing							Caps/Floors
Valuation	Curve	01/27/05	Valuation	01/31/05	All Values In			EUR
Market Value	380,275.63		Delta (Hedge)	-0.00005	ATM Strike	3.16316		
Calculate	Premium		Gamma (10bps)	0.06451	DV01	66.70		
Premium	3.80276		Vega (1%)	14,437.27	Yield Value	90.56		
Fiat Vol			Theta (1-day)	-165.71	Refresh			

Main | Curves | Volatility | Valuation | Hist Cashflow

Australia 61 2 9277 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P.
 0 27-Jan-05 10:57:55

- **Strangle**: has the same rationale of a Straddle but will have different strikes for the Cap (higher strike) and Floor (lower strike). This feature makes a Strangle cheaper than a Straddle.

<HELP> for explanation. N248 Index SWPM

Options | New Deal | Save Deal | View | Vol. Defaults | SWAP MANAGER

Deal	Counterparty	CAP_CNTRPARTY	Ticker	/CAP	Series		Deal #	
Type	Straddle							DETAIL
Notional	10	MM	Index	EUR006M				DETAIL
Currency	EUR	Latest Index	2.40321					
Effective	07/31/05	0 YR	x 5 YR	Reset/Pay Freq	SemiAnnual			
Maturity	01/31/10	Cap Strike	3.16316 % Rcv x 1	Discount Curve	45 Bid	New Euro Currency		
Floor Strike	3.00000 % Rcv x 1	Forward Curve	45 Bid	New Euro Currency				
Day Count	ACT	360	Volatility Curve	EUR				
Bus Day Adj	ModifiedFollowing							Caps/Floors
Valuation	Curve	01/27/05	Valuation	01/31/05	All Values In			EUR
Market Value	340,442.48		Delta (Hedge)	0.05446	ATM Strike	3.16316		
Calculate	Premium		Gamma (10bps)	0.06608	DV01	-182.34		
Premium	3.40442		Vega (1%)	14,168.23	Yield Value	81.07		
Fiat Vol			Theta (1-day)	-165.21	Refresh			

Main | Curves | Volatility | Valuation | Hist Cashflow

Australia 61 2 9277 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2005 Bloomberg L.P.
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