

## IRS *Path Dependent*

*IRS Path Dependent* is characterized, for *Party A*, by a path dependent option, an option whose value depends on the time sequence of values of the underlying rather than just its final value. In details, the gearing *Spread* at time  $t$ , depends on the value of the *Spread* estimated at the time before ( $t-1$ ).



**IRS Path Dependent Template on Fairmat**

Up-front	–	
Principal (Party A)	<b>Na</b>	
Principal (Party B)	<b>Nb</b>	
Trade Date		
Effective Date	Trading date (simulation start date)	
Termination Date	Contract initial date	
Payment Frequency (Party A)	<b>PdA</b> [end] or <b>PdB</b> [end]	
Payment Frequency (Party B)	<b>matEur</b> -Year (exchange per year)	
	<b>matEur</b> -Year (exchange per year)	
<b>Exchange</b>	<b>Party A</b>	<b>Party B</b>
From 1 to <b>gap</b> ( <b>matEur</b> -Year periods)	–	<b>matEur</b> -Year Euribor
From 1 to <b>TD-gap</b> if linked to <b>Ex</b> dates (From <b>gap</b> +1 to <b>TD</b> if linked to <b>PdA</b> dates)	$\max[0; \text{matEur-Year Euribor} * \text{Pathdep}]$	<b>matEur</b> -Year Euribor
	<b>Pathdep</b> is a <i>Fairmat</i> recurrence function	
<b>Convention</b>	<b>Party A</b>	<b>Party B</b>
Reset Dates	<i>Advance</i> , <b>RdayA</b> days before	<i>Advance</i> , <b>RdayB</b> days before
Day Count Fraction	<b>DurA</b>	<b>DurB</b>

Table 2: Example of IRS Path Dependent template described through Fairmat objects.

(input linked to <b>Spread</b> and <b>Pathdep</b> functions)							
<b>Na</b>	<b>Nb</b>	<b>pduA</b>	<b>pduB</b>	<b>exu</b>	<b>threshEur</b>	<b>Sprlow</b>	<b>Sprhigh</b>
1000000	1000000	04/01/2007	04/01/2007	04/07/2008	0.048	-0.2	1.6
1000000	1000000	04/04/2007	04/04/2007	04/10/2008	0.048	-0.2	1.6
1000000	1000000	04/07/2007	04/07/2007	04/01/2009	0.048	-0.2	1.6
1000000	1000000	04/10/2007	04/10/2007	04/04/2009	0.048	-0.2	1.6
1000000	1000000	04/01/2008	04/01/2008	04/07/2009	0.048	-0.2	1.6
1000000	1000000	04/04/2008	04/04/2008	04/10/2009	0.048	-0.2	1.6
1000000	1000000	04/07/2008	04/07/2008	04/01/2010	0.048	-0.2	1.6
1000000	1000000	04/10/2008	04/10/2008	04/04/2010	0.048	-0.2	1.6
1000000	1000000	04/01/2009	04/01/2009	04/07/2010	0.048	-0.2	1.6
1000000	1000000	04/04/2009	04/04/2009	04/10/2010	0.048	-0.2	1.6
1000000	1000000	04/07/2009	04/07/2009	04/01/2011	0.048	-0.2	1.6
1000000	1000000	04/10/2009	04/10/2009	04/04/2011	0.048	-0.2	1.6
1000000	1000000	04/01/2010	04/01/2010	04/07/2011	0.048	-0.2	1.6
1000000	1000000	04/04/2010	04/04/2010	04/10/2011	0.048	-0.2	1.6
1000000	1000000	04/07/2010	04/07/2010				
1000000	1000000	04/10/2010	04/10/2010				
1000000	1000000	04/01/2011	04/01/2011				
1000000	1000000	04/04/2011	04/04/2011				
1000000	1000000	04/07/2011	04/07/2011				
1000000	1000000	04/10/2011	04/10/2011				

Table 3: *Input (Vectors) of IRS Path Dependent template loaded on “Parameters & Functions” Fairmat environment.*

Other input that user finds into “Parameters & Functions” Fairmat environment are:

- **RdayA**: (Party A) number of days before *Initial (Advance) / Ending (Ar-rears)* period;
- **RdayB**: (Party B) number of days before *Initial (Advance) / Ending (Ar-rears)* period;
- **matEur**: time horizon of Euribor rate expressed into year fraction;
- **gap**: number of periods before **Pathdep** functions;
- **Spread**: function called into **Pathdep** recurrence function;
- **Pathdep**: recurrence function expression of (*Party A*) payoff, from 1 to **TD-gap** if linked to **Ex** dates, from **gap**+1 to **TD** if linked to **PdA** dates;
- **Floor**: analytic function expression of minimum *Party A* rate;
- **PdA**: date’s vector transformation from **pduA** vector (see Table 3);
- **PdB**: date’s vector transformation from **pduB** vector (see Table 3);
- **Ex**: date’s vector transformation from **exu** vector (see Table 3);
- **RdA**: (Party A) date’s vector transformation from **pduA** vector (see Table 3) using **RdayA** constant;
- **RdB**: (Party A) date’s vector transformation from **pduB** vector (see Table 3) using **RdayB** constant;

- **DurA**: date's vector difference transformation from **pduA** vector (see Table 3);
- **DurB**: date's vector difference transformation from **pduB** vector (see Table 3);
- **zr**: *zero* rate (derived from *spot* rate);
- **TD**: number of last payment date (e.g. quarterly payments with time horizon 5 year equals to 20 payments,  $1/0.25 * 5$ ).