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### IMM EURODOLLAR SYNTHETIC FORWARD RATES

Date	Days	IMM	Last	NRate	6-Mo	1-Yr	2-Yr	18-Mo	7-Yr	10-Yr
Spot strip	44	Front	94.9132	5.0868	5.280	5.409	5.423	5.421	5.687	5.857
1)	6/21/06	91 EDM6	94.7450s	5.2550	5.338	5.439	5.437	5.438	5.702	5.871
2)	9/20/06	91 EDU6	94.6500s	5.3500	5.399	5.454	5.450	5.448	5.729	
3)	12/20/06	91 EDZ6	94.6250s	5.3750	5.394	5.443	5.455	5.444	5.753	
4)	3/21/07	91 EDH7	94.6600s	5.3400	5.363	5.427	5.462	5.441	5.778	
5)	6/20/07	91 EDM7	94.6850s	5.3150	5.346	5.424	5.477	5.449	5.805	
6)	9/19/07	91 EDU7	94.6950s	5.3050	5.346	5.435	5.499	5.468	5.833	
7)	12/19/07	91 EDZ7	94.6850s	5.3150	5.358	5.456	5.527	5.494	5.863	
8)	3/19/08	91 EDH8	94.6700s	5.3300	5.379	5.486	5.561	5.524	5.894	
9)	6/18/08	91 EDM8	94.6450s	5.3550	5.406	5.518	5.596	5.558		
10)	9/17/08	91 EDU8	94.6150s	5.3850	5.444	5.553	5.633			
11)	12/17/08	91 EDZ8	94.5700s	5.4300	5.480	5.590	5.670			
12)	3/18/09	91 EDH9	94.5450s	5.4550	5.510	5.627	5.707			
13)	6/17/09	91 EDM9	94.5100s	5.4900	5.546	5.667	5.744			
14)	9/16/09	91 EDU9	94.4750s	5.5250	5.589	5.706	5.781			

Exchanges:

IMM, SMX

FRA and Bond yld:

Daytype ACT/ACT

Frequency \$

m-mkt yield

Start	End	days	years	Front	stub	Back	stub	Bond yield	ACT/360
5/ 8/06	7/ 1/06	54	0.15	5.09%	44 days	5.22%	10 days	5.241	5.118
5/ 8/06	8/ 1/06	85	0.23	5.09%	44 days	5.24%	41 days	5.287	5.174
5/ 8/06	9/ 1/06	116	0.32	5.09%	44 days	5.25%	72 days	5.308	5.207
5/ 8/06	10/ 1/06	146	0.40	5.09%	44 days	5.32%	11 days	5.328	5.237
5/ 8/06	11/ 1/06	177	0.48	5.09%	44 days	5.33%	42 days	5.352	5.273

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Use EDSF to monitor and calculate effective yields for synthetic forward rate agreements, constructed with strips of Chicago Mercantile Exchange (IMM) or Singapore International Monetary Exchange (SGX) Eurodollar futures contracts. For each futures contract, additional contracts are strung together to produce as many synthetic FRAs as possible. You can specify the length of the strips in multiples of three months. Strips of one year or less are money market yields, and strips of more than one year are bond equivalent yields.

HOW TO...

- 1) How to Use EDSF
- 2) How to Change the Parameters for Convexity
- 3) How to Modify Your Day Counts Off the Frequency of the Underlying Instrument
- 4) How to Modify Your Day Counts and Frequency Defaults
- 5) How to Drag and Drop Securities

SCREEN DESCRIPTIONS

6) IMM/SGX Eurodollar Synthetic Forward Rates Screen

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How to Use EDSF

Once you enter EDSF <Go>, the IMM/SGX Eurodollar Synthetic Forward Rates screen appears, where you can monitor and calculate effective yields for synthetic forward rate agreements. The information on the screen highlights when there is a market update. You can choose from the following options:

- Click on the highlighted field to the right of Days to display the dropdown menu, where you can choose to display either Chicago Mercantile Exchange (IMM) or Singapore International Monetary Exchange (SGX) information, and then press <Go>.

- Click on the highlighted field to the right of IMM/SGX to display the dropdown menu, where you can choose from the following price types: bid, ask, latest, or trade price, and then press <Go>.

- Enter your yield(s) in the highlighted field(s) below the Bid/Ask/Last/Trade field to price debt instruments, so you can determine the most effective yield priced off of a credit curve, and then press <Go>.

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- Click on the N/A Rate field to display the dropdown menu, where you can choose to calculate your rates using no convexity bias adjustment [N] or you can adjust for convexity bias [A], and then press <Go>.

- To the right of the N/A Rate field are a series of highlighted fields where you can enter your spot strip information or select from the dropdown menu(s) that appear, and then press <Go>.

- At the bottom of the screen are five customizable strips. Enter your Start and/or End date information in the applicable highlighted field(s) to customize your data and date range and help you hedge debt for a time period that does not fall exactly on a contract expiration date, and then press <Go>.

**\*Remember\***

\* The Custom Strip Defaults section on the Historical Convention Defaults Commodities screen, PDFC, allows you to update the Start and End default dates. PDFC <HELP> displays further information.

\* Custom strip yields are expressed as both a bond equivalent yield and a

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money market yield.

- \* Synthetic forward rate functions use your personal defaults for strip dates with start dates that are greater than the settlement date of the future.
- \* All strips of more than one year are calculated as a bond equivalent yield. Strips of one year or less are calculated as a money market yield. Both yields are calculated using the day type specified in the lower right corner of the screen.

- Enter your Front and/or Back stub rates in the applicable highlighted field(s), and then press <Go>.

\*Remember\*

The spot strip forward rates are calculated using various maturities. They use a front stub and back stub surrounding a string of contracts to cover the specific time period.

- Enter 98 <Go> to save your defaults.

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- Enter 99 <Go> to display the Parameters for Convexity window. The How to Change the Parameters for Convexity section of this guide displays further information.

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How to Change the Parameters for Convexity

To adjust for convexity bias and better hedge your positions, complete the following steps:

1. Enter EDSF <Go> to display the IMM/SGX Eurodollar Synthetic Forward Rates screen.
2. Enter 99 <Go> to display the Parameters for Convexity window, where you can enter the Mean Reversion Speed and/or the Rate Volatility in the corresponding highlighted field(s).



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How to Modify Your Day Counts Off the Frequency of the Underlying Instrument

You can measure the most effective yield for a security by modifying the day count off the frequency of the underlying instrument, as follows:

1. From the IMM/SGX Eurodollar Synthetic Forward Rates screen, move your cursor to the Daytype field to display the dropdown menu, where you can choose from the list of options.
2. Move your cursor to the Frequency field to display the dropdown menu, where you can choose from the list of options.
3. Press <Go> to complete the update.

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How to Modify Your Day Counts and Frequency Defaults

1. Enter PDFC <Go> to display the Historical Convention Defaults Commodities screen.
2. In the Synthetic FRA Default section, enter your default information in the applicable highlighted field(s).
3. Press <Go>, then enter 1 <Go> to update your default settings.

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### How to Drag and Drop Securities

Once you enter EDSF <Go>, a pushpin icon appears in the upper right corner of the IMM/SGX Eurodollar Synthetic Forward Rates screen.

**\*Remember\***

The Enable Drag and Drop default in PDF enables the drag and drop option. PDF <HELP> displays further information.

1. Click and hold on the pushpin.
2. Drag the pushpin into a Microsoft® Excel spreadsheet or a Word document.
3. Release your mouse to drop the security's listed in EDSF into the spreadsheet or document.

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IMM/SGX Eurodollar Synthetic Forward Rates Screen

Spot strip forward rates are calculated using various maturities. They use a front stub and back stub surrounding a string of contracts to cover the specific time period.

**\*Remember\***

Information on the screen highlights to designate a market update.

Once you select to display the IMM or SGX Eurodollar Synthetic Forward Rates screen, the time stamp may appear on the top left corner of the screen, along with the following information:

Date:

The date, two business days after the valuation date of the given futures contract.

**\*Remember\***

For the front stub, Spot strip appears.

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Days:

The number of days between the valuation date of the futures contract, and the valuation date of the next contract in the series. This is the term for which the rate of that contract is used. If there is no subsequent contract, it is assumed to be 91 days.

\*Remember\*

For the front stub, the number of days until the valuation date of the first contract appears.

Exchange Code (title does not appear on the screen):

The exchange code appears to the right of the Days field if the futures contracts trades on more than one exchange. The dropdown menu displays a list of options. Below the exchange code, the contract name may appear.

Bid/Ask/Last/Trade:

The type of price for the futures contract. For the spot strip, it is the price of the spot rate, where price equals 100 minus the rate. The dropdown menu displays the following options:

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- B - Bid Price. Specifies the current bid, or, if there is no bid, the last trade.

- A - Ask Price. Specifies either the current ask or the last trade.

- L - Latest Price. Specifies the most recent market indicator.

- T - Trade Price. Specifies the last trade.

\*Remember\*

- You can enter either a price or a rate in the highlighted field, and the Synthetic Forward Rates screen converts it to the price by assuming that values between 75 and 100 are prices and values between 0 and 25 are rates.

- Letters may appear beside the price to indicate: settlement [s], bid [b], ask [a], yesterday's closing price [y], trade [t], or user input [u].

Rate:

The rate of the futures contract. The dropdown menu displays the following options:

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- N - No convexity bias adjustment. This is the normal rate, for example, Rate = 100 - Price.

- A - Adjust for convexity bias. The convexity adjusted rates.

**\*Remember\***

- Enter 99 <Go> to update the parameters used in the convexity adjustment. The How to Change the Parameters for Convexity section of this guide displays further information.

- Since futures contracts have a fixed tick value (e.g., \$25 per basis point), they have no convexity. Therefore, the rates implied by the futures are biased when compared to truly convex securities, like coupon bonds or interest rate swaps. Enter (A) to adjust the rates for this bias. For a further description of the convexity adjustment, see George Kirikos's and David Novak's article "Convexity Conundrums" in the March 1997 Risk Magazine, (vol. 10, #3).

[number of] -Mo/Yr:

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The forward strip yields. Strips must be a multiple of 3 months in length and at least 6 months and not more than 10 years to maturity. Invalid strip lengths are reset to one year. The strips of one year or less are calculated as money market yields using the day type specified in the m-mkt yield field. The dropdown menu displays a list of options.

**\*Remember\***

Strips greater than one year are bond equivalent yields using the frequency and day type specified under the FRA and Bond yield field. The spot strips reflect the term specified, for example, a one-year spot strip covers a one-year period. A forward strip is comprised of a year's worth of contracts, for example, a one-year forward strip is composed of four contracts, one contract for every three months in the contract).

**Exchanges:**

The exchange code(s) appear if the futures contracts trades on more than one exchange.

**Daytype:**

The day type. The method used to determine how accrued interest is

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calculated and how coupon periods are determined for synthetic forward rates. The dropdown menu displays a list of options.

Frequency:

The equivalent coupon frequency used in the calculations. The dropdown menu displays a list of options. Enter [Z] to specify a money market calculation for the entire matrix, regardless of the length of the strip.

\*Remember\*

All strips over one year are calculated as a bond equivalent yield. Strips of one year or less are calculated as a money market yield. Both yields are calculated using the day type specified in the lower right corner of the screen.

Start:

The start date for the custom strip.

End:

The end date for the custom strip.

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<p>days: The number of days from the Start to the End date.</p> <p>years: The number of days between the Start and End date, divided by 365.</p> <p>Front Stub: The rate received from the Start date to the date of the first full contract in the series, along with the number of days in the period. This rate is interpolated from the rate of the previous full contract to the next full contract.</p> <p><b>*Remember*</b> The front and back stubs surrounding a string of contracts cover the specific time period.</p> <p>Back Stub: The rate received from the last day of the full contract to the last day of the strip entirely, along with the number of days in the period. This rate is interpolated from the rate of the last contract whose term begins during</p>		
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the strip. The spot strip forward rates are calculated using various maturities.

**\*Remember\***

The front and back stubs surrounding a string of contracts cover the specific time period.

**Bond yield:**

The bond equivalent yield of the custom strip, calculated using the day type and coupon frequency specified on the right side of the screen.

**m-mkt yield:**

The money market yield of the custom strip, calculated using the day type specified. For a list of choices, move your cursor to the highlighted field. This day type is also used to calculate the synthetic forward rates given for maturities of one year or less.

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CALCULATIONS

The following values are used for the benchmark calculations for the six-month and one-year yields:

- Mar d1=91 days r1=6.00%
- Jun d2=91 days r2=7.0
- Sep d3=91 days r3=8.00
- Dec d4=91 days r4=9.0
- 91 days @ 6.00
- 91 days @ 7.00
- 91 days @ 8.00
- 91 days @ 9.00
- 182 days @ 6.553 (conv yield)
- 364 days @ 7.675 (bond equiv)

6-Month Yields

$$6.553 = (1 + ((d1 * r1) / 36000)) * (1 + ((d2 * r2) / 36000)) * \dots * (1 + ((dn * rn) / 36000)) - 1 \quad * (36000 / d1 + d2 + \dots + dn)$$

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where

n = number of periods

For example:

$$\left( (1 + (91 * 6 / 36000)) * (1 + (91 * 7 / 36000)) - 1 \right) * 197.80219 = 6.553$$

1-Year Yields

$$7.675 = 200 * \left[ \left( (1 + d1 * r1 / 36000) * (1 + d2 * r2 / 36000) * (1 + d3 * r3 / 36000) * (1 + d4 * r4 / 36000) \right)^{(182.5 / (d1 + d2 + d3 + d4))} - 1 \right]$$

General Form Equation for Conventional Yields

$$\text{Rate} = \left[ \left( 1 + d1 * r1 / 36000 \right) * \dots * \left( 1 + di * ri / 36000 \right) - 1 \right] * 36000 / di + \dots + di$$

di = # of days

ri = interest rate

a = Number of periods per year

y = (Days per year) / a

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General Form Equation for Bond Equivalent Yields

$$\text{Rate} = a * 100 * [ ((1+d1*r1/36000) * (d2*r2/36000) \dots (1+d1*r1/36000)) ^ {y/d1+d2+\dots+d1} - 1 ]$$

di = # of days

ri = interest rate

a = Number of periods per year

y = (Days per year) / A

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