IT-Concept for MM/FX MCC

Risk Management Support & Control

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Revision log

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04.03.2004	J. Richelsen	First draft
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Table of contents

1 Overview

1.1 About this document

This document gives an overview about the architecture of the new Money Market MCC, especially about the source system Sungard.

1.2 Legal Obligation

The German Banking Supervision requires that a Market Conformity Check is executed for each trade (not necessarily immediately after the trade has been done).

1.3 Glossary

Abbreviation	Explanation
MCC	Market Conformity Check
MM	Money market
FX	Foreign Exchange

2 Architecture

2.1 Data import

2.1.1 General

Source-systems that deliver files should invoke the import, if possible (e.g. sqlloader).
Data of source-systems with Database interfaces need to be collected in a batch job (e.g. java-import-tool).
The common data is stored in a general trade-table and the source-system dependent data is stored each in a different source-system table.
The tables are linked with a trade_id that is unique for the whole database.
The data is stored with a job_id that is different for each trade_date, source-system and import-run. This enables the rerun of processing a source-system for the same trade-date.
Small mappings might be done during the import, like date conversions.
The main checks/conversions, which are needed for further analysis (e.g. storno, etc.) should be included into the trade-status-checks.

2.1.2 Sungard

The data is delivered by Connect:Direct file transfer.
All date and time information is assumed to be Düsseldorf local time (MEZ/MESZ). There will be two file, one with FX-trades and one with MM-trades.

2.1.3 Client selection criteria

For the Locations Düsseldorf, Luxemburg and London separate file are produced. Since the London file also contains Asian trades, that file is processed in a special way by separatinf the trades depending on the trader location. Using the trader location of book of the trade is looked up in PARIS.

Client	**PARIS trader location**	**Location name**
Sungard Moneymarket Tokio (MMT)	024	Tokyo
Sungard Moneymarket HongKong (MMH)	026	Hong Kong
	038	Shanghai
	041	Sydney
	056	Singapore
Sungard Moneymarket London (MML)	other	

2.1.4 Field reference

The data is extracted from Sungard about 19:00 into a semicolon separated ascii file. It contains a header records with the column headers.
The last line (indicated by a #) contains as checksum the number of business records, the start and the stop time of the business interval extracted and finally the extraction timestamp. Example:

```
#;435;25.03.2004 08:08;25.03.2004 20:16;25.03.2004 22:44
```

A single record consists of the fields described in the following tables. For float filed the scientific notation is used.

2.1.4.1 FX file

Nr	**field name**	**data type**	**definition**	**example**
1	RecType	integer	type of record (1=new, 2=amendment)	1
2	Group Id	integer	ID of the trade group (to identify storno-chains)	0002476564
3	Trade Code	integer	ID of the trade from SunGard	0002476564
4	comm	char	currency pair of cash trade in SunGard ISO Code (see appendix)	EUR-CHF
5	Type	char	instrument subtype (type = FX trade)	New FX Spot
6	InstrumentType	integer	Instrument type ID to identify the type	1

			1= Money Market; 0=Foreign Exchange	
7	InstrSubType	integer	Instrument Subtype (see appendix for description)	0
8	TradeRole	integer	Trade Role (see appendix for description)	1
9	RefInstrument	char	identifier for a reference instrument of the trade	
10	ValueDate	date	value date, the date on which the trade is to be accounted	30.07.03
11	NettorRateDateTime	date	DUS trading time, time when the trade was entered into the system (lookup time for market rate feed)	20030730 16:42:12
12	NettoRate	float	net rate of trade (=Dealt Rate +/– Margin Points)	1.5883000e+00
13	MarketRate	float	market exhange rate between the two traded currencies at the time of the trade, automatically inserted by Reuters data feed	1.5482000e+00
14	% Deviation	float	procentual difference between <Rate> and <Market>*[1] Formula: |(NettoRate – MarketRate)/ MarketRate * 100|	2.5901000e+00
15	Amount	float	amount of money traded in ccy1 (for EUR-CHF spot trade the amount is in Euro)	2.0000000e+09
16	NT-Id	char	Login ID of the trader	D012345
17	Trader	char	name of the trader	Wilhelm Johnen
18	Counterparty	char	counterparty for which the trade has been done	Siegburg, KSK
19	Book	char	Book traded on, used for LU mapping	DFS-SPOT
20	CounterptyGroup	char	counterparty group	SPK-NRW
21	Info	char	user defined field	
22	Memo	char	additional information inserted by the trader	EURIBOR + 16bp
23	OpeningDatetime	date	date/time when the original trade was opened (to determine an amendment) – trade time	02.06.03

24	TradeProcess	integer	SunGard Trade Processing Status (storno, storno reversal, storno void)	2
25	EODrate	float	End of day fx rate	1.641755684e+00
26	EODRateDate	date	Date of the end of day fx rate	30.07.2003
27	DealtRate	Float		
28	MarginPoints	Float		
29	UserField2	char		

2.1.4.2 MM file

Nr	field name	data type	definition	example
1	RecType	integer	type of record (1=new, 2=amendment)	1
2	Group Id	integer	ID of the trade group (to identify storno-chains)	0002471610
3	Trade Code	integer	ID of the trade from SunGard	0002476576
4	comm	char	currency of cash trade SunGard ISO Code (see appendix)	AUD
5	Type	char	Instrument subtype (type = MM trade)	Loan/depo
6	InstrumentType	integer	Instrument type ID to identify the type 1= Money Market; 0=Foreign Exchange	1
7	InstrSubType	integer	Instrument Subtype (see appendix for description)	0
8	TradeRole	integer	Trade Role (see appendix for description)	1
9	RefInstrument	char	identifier for EONIA deposit	EONIA
10	StartDate	date	start date/time in dd.mm.yy format when the cash trade is due to begin	02.06.03
11	MaturityDate	date	end date/time in dd.mm.yy format when the cash trade is due to end	16.06.03
12	NettoRateDateTime	date	DUS time when the trade was fixed (lookup time for market rate feed)	20030601 11:16:12

13	NettoRate	float	net rate of trade (=Dealt Rate +/– Margin Points)	4.732500000e+00
14	MarketRate	float	Reuters real time feed interest rate at the time the trade was entered into the system	4.605500000e+00
15	% Deviation	float	procentual difference between <Margin Rate> and <Market Rate> Formula: |(NettoRate – MarketRate)/ MarketRate * 100|	2.757500000e+00
16	Amount	float	the amount of money that was traded (currency of MM deal)	5.000000000 e+09
17	NT-Id	char	Login ID of the trader	D012345
18	Trader	char	name of the trader	Claus Sieg
19	Counterparty	char	counterparty for which the trade has been done	WESTLB
20	Book	char	Book traded on, used for LU mapping	DMM-DMC
21	CounterptyGroup	char	trading group	WLB-GFM
22	Info	char	additional information inserted by the trader	
23	Memo	char	user defined info field for settlement i.e.	EURIBOR + 16bp
24	OpeningDatetime	date	date/time when the original trade was opened (to determine an amendment) – trade time	02.06.03 11:15:13
25	TradeProcess	integer	SunGard Trade Processing Status (storno, storno reversal, storno void)	1
26	EODrate	float	End of day fx rate	1.641755684e+00
27	EODRateDate	date	Date of the end of day fx rate	30.07.2003
28	DealtRate	Float		
29	MarginPoints	Float		
30	UserField2	char		

2.2 Trade status checks

2.2.1 General

To calculate the status of a trade a set of expressions is evaluated. If the expression returns true or if the expression is empty, the evaluation is stopped and the related state is taken as the resulting state.
An expression consists of expressions combined with the logical and-operator (&&) or the or-operator (||). An expression can also be negated with the not-operator (!) and finally braces can be used to group expressions. A nuclear expression (a condition) is then evaluated by executing a java-function of the trade.
An example:

status_name	**expression**
no_check	product_not_mcc_relevant || is_storno
internal_deal	is_internal
high_low_check	is_net_trade
historical_check	

In the example the first expression "product_not_mcc_relevant" is extracted and the corresponding java-method is looked up in a special configuration table and executed on the trade-object. Then the next condition "is_storno" is checked against the trade-object. The result is logically combined with the or-operator. Assuming the result is true, the final state would be "no_check". Again assuming the first three expression return false, the forth state "historical_check" would become the final result.

2.2.2 Sungard Money Market

2.2.2.1 Commodity name

The commodity name for MM-products is generally the currency name. For those currencies that are configured in a list with the name "MATURITY_DEPENDENT_COMODITY" in the database table T42_MGB_CONFIGURATION, a maturity-code is added to create the commodity name. This name builds the granularity of the price thresholds. See also section "Price/time thresholds".
The following table shows the time intervals:

Maturity Name	**Interval of „maturityDate – startDate“**
ON	T < 4 Days
1W	4 <= T < 10 Days
2W	10 <= T < 18 Days
3W	18 <= T < 26 Days
1M	26 <= T < 45 Days
2M	45 <= T < 77 Days
3M	77 <= T < 138 Days
6M	138 <= T < 230 Days
9M	230 <= T < 320 Days
1Y	320 <= T < 550 Days
2Y	T >=550 Days

2.2.2.2 Definition of trade status rules

The following rules are used to calculate the status of the trade. The last 4 rules are executed after the Bloomberg data is received.

status_name	**expression**

No check	!is_mcc_product
No check (technical user)	is_technical_user
No check (pseudo book)	is_pseudo_book
Moscow Interbank Currency Exchange trade	is_micex_trade
EONIA Fixing	is_eonia && !is_new_record
O.K. Historical Information	is_history_record
Already checked an older version	!is_mcc_relevant_change
G/L funding	is_gl_funding
Floating deposit	has_reference_instrument
No Reuters price (BLB check)	has_no_reuters_price
Reuters out of turn over limit.	is_out_of_turnover_limit && !is_out_of_reuters_price
Reuters price out of range (BLB check)	is_out_of_reuters_price && !is_bagatelle
Bagatelle	is_out_of_reuters_price && is_bagatelle
O.K.	
No price	has_no_bloomberg_price
Bloomberg out of turn over limit.	is_bloomberg_out_of_turnover_limit
Out of price range	is_out_of_bloomberg_price
O.K.	

The following conditions refer to values from fields, which can be found in the MM-file delivered from Sungard.

2.2.2.3 Condition: is_mcc_product

A Sungard product is defined by the 4 fields "InstrumentType", "InstrSubType", "TradeRole" and "RefInstrument". The following table shows which products are mcc relevant.

Product	InstrumentType	InstrSubType	TradeRole	RefInstrument	mcc?
Call Money	1	1	12		Y
Call Money Pending -	1	1	13		Y
Call Money Pending +	1	1	14		Y
MM Nostro Rollover	1	0	9		N
MM Balance Nostro	1	7	9		N
Eonia Deposit	1	0	1	EONIA	Y
Deposit XXX n X *)	1	0	1	XXX n X	Y
Deposit	1	0	1		Y
Commercial Paper	1	5	1		Y
Treasury Bills	1	3	1		Y
CD	1	2	1		Y
FX Spot	0	0	2		Y
FX Forward Outright	0	0	3		Y
FX Option Forward	0	1	2		Y
FX Option Forward	0	1	3		Y
FX Swap near leg	0	0	4		Y
FX Swap far leg	0	0	5		Y
FX Forward Covered	0	0	6		Y
FX Drawdown	0	0	7		Y
FX Nostro Rollover	0	0	9		N
FX Nostro Rollover	0	2	9		N
FX Position Roll	0	0	10		N
FX mismatch Swap near leg	0	0	21		Y
FX mismatch Swap far leg	0	0	22		Y
FX Balance	0	2	1		N

*) This pattern shows the name and the duration of an interest rate like 'EURIBOR 6 M'.

2.2.2.4 Condition: is_technical_user
The "Trader" code "XRUNNER" and codes starting with "LIQ" are technical user.

2.2.2.5 Condition: is_pseudo_book
If the field "Book" starts with the string "PSEUDO" it is a pseudo book.

2.2.2.6 Condition: is_micex_trade
Return true, if the field "CounterpartyId" is equal to "MICEX".

2.2.2.7 Condition: is_libor_spread_book
If the field "Book" is included in the list "LIBOR_SPREAD_BOOKS" which can be configured in the database.
The current list contains the NYC books "NBU_CRED,NMM_CL,NCM_CRED,NCM_MONY"

2.2.2.8 Condition: is_gl_funding
If the field "User filed2" contains the string "NY_GL_Funding", the conditions returns true.

2.2.2.9 Condition: is_mcc_relevant_change
Versions of trades are recognized by the same tradeGroupId. This conditions looks for previous versions of the trade that have been loaded successfully and does a field comparision. If a mcc-relevant filed has changed, it returns true.
The following fields are compared:
"currency", "price", "settlementDate", "tradeDate", "tradeType", "volume"

2.2.2.10 Condition: is_eonia
Shows if the trade type is "Eonia deposit":

Product	InstrumentType	InstrSubType	TradeRole	RefInstrument
Eonia Deposit	1	0	1	EONIA

2.2.2.11 Condition: has_reference_instrument
Returns true if the field " RefInstrument" has any value.

2.2.2.12 Condition: is_new_record
The field "RecType" holds the information. If the value is "1", it is new trade.

2.2.2.13 Condition: is_history_record
The field "RecType" holds the information. If the value is "0", it is informational record that shows the history of a trade.

2.2.2.14 Condition: has_no_reuters_price
Sungard delivers market prices from Reuters. If the field "MarketRate" is unequal to zero, no Reuters price was available.

2.2.2.15 Condition: is_out_of_turnover_limit
The basis of this condition is the turnover. It is calculated as follows:

$$\frac{\left|(\text{marketRate} - \text{nettoRate}) * \text{amount} * (\text{maturityDate} - \text{startDate})\right|}{\text{fxRate} * 100 * 360}$$

If the turnover is greater than a defined limit, the condition is true.
The value " SUNGARD_TURNOUT_LIMIT" can be configured in the database.

2.2.2.16 Condition: is_out_of_reuters_price
An interval is created around the "MarketRate" using the tolerance values from the priceCheckCategory that is linked to the commodity of the trade (e.g. EUR, EUR-AED). If the "NettoRate" is inside of the interval, the condition is false, otherwise true.
See also section "Price/time thresholds".

2.2.2.17 Condition: is_bagatelle

The basis of this condition is the turnover. It is calculated as follows:

$$\frac{\left|(\text{marketRate} - \text{nettoRate}) * \text{amount} * (\text{maturityDate} - \text{startDate})\right|}{\text{fxRate} * 100 * 360}$$

If the turnover is smaller than a defined limit, the condition is true.
The value "SUNGARD_BAGATELLE_LIMIT" can be configured in the database.

2.2.3 Sungard Foreign Exchange

2.2.3.1 Definition of trade statuses

The following rules are used to calculate the status of the trade. The last 4 rules are executed after the Bloomberg data is received.

status_name	expression
No check	!is_mcc_product
No check (technical user)	is_technical_user
No check (pseudo book)	is_pseudo_book
Moscow Interbank Currency Exchange trade	is_micex_trade
O.K. Historical Information	is_history_record
Already checked an older version	!is_mcc_relevant_change
G/L funding	is_gl_funding
New FX Option Forward	is_fx_option_forward && is_new_record
New FX Drawdown	is_fx_drawdown && is_new_record
Suspicious MITTE-BOOK	is_mitte_book && !is_euro_commodity
MITTE-BOOK	is_mitte_book
No Reuters price (BLB check)	has_no_reuters_price
Reuters out of turn over limit.	is_out_of_turnover_limit && !is_out_of_reuters_price
Reuters price out of range (BLB check)	is_out_of_reuters_price && !is_bagatelle
Bagatelle	is_out_of_reuters_price && is_bagatelle
O.K.	
No price	has_no_bloomberg_price
Bloomberg out of turn over limit.	is_bloomberg_out_of_turnover_limit
Out of price range	is_out_of_bloomberg_price
O.K.	

The following conditions refer to values from fields, which can be found in the FX-file delivered from Sungard.

2.2.3.2 Condition: is_mcc_product

A Sungard product is defined by the 4 fields "InstrumentType", "InstrSubType", "TradeRole" and "RefInstrument". The following table shows which products are mcc relevant.

Product	InstrumentType	InstrSubType	TradeRole	RefInstrument	mcc?
Call Money	1	1	12		Y
Call Money Pending -	1	1	13		Y
Call Money Pending +	1	1	14		Y
MM Nostro Rollover	1	0	9		N
MM Balance Nostro	1	7	9		N
Eonia Deposit	1	0	1	EONIA	Y
Deposit XXX n X *)	1	0	1	XXX n X	Y
Deposit	1	0	1		Y
Commercial Paper	1	5	1		Y
Treasury Bills	1	3	1		Y

CD	1	2	1		Y
FX Spot	0	0	2		Y
FX Forward Outright	0	0	3		Y
FX Option Forward	0	1	2		Y
FX Option Forward	0	1	3		Y
FX Swap near leg	0	0	4		Y
FX Swap far leg	0	0	5		Y
FX Forward Covered	0	0	6		Y
FX Drawdown	0	0	7		Y
FX Nostro Rollover	0	0	9		N
FX Nostro Rollover	0	2	9		N
FX Position Roll	0	0	10		N
FX mismatch Swap near leg	0	0	21		Y
FX mismatch Swap far leg	0	0	22		Y
FX Balance	0	2	1		N

*) This pattern shows the name and the duration of an interest rate like 'EURIBOR 6 M'.

2.2.3.3 Condition: is_technical_user

The "Trader" code "XRUNNER" and codes starting with "LIQ" are technical user.

2.2.3.4 Condition: is_libor_spread_book

If the field "Book" is included in the list "LIBOR_SPREAD_BOOKS" which can be configured in the database.
The current list contains the NYC books "NBU_CRED,NMM_CL,NCM_CRED,NCM_MONY"

2.2.3.5 Condition: is_pseudo_book

If the field "Book" starts with the string "PSEUDO" it is a pseudo book.

2.2.3.6 Condition: is_micex_trade

Return true, if the field "CounterpartyId" is equal to "MICEX".

2.2.3.7 Condition: is_mitte_book

If the field "Book" has the value "MITTE-BOOK" the condition returns true.

2.2.3.8 Condition: is_euro_commodity

If the field "Commodity" contains the string "EUR" the condition returns true.

2.2.3.9 Condition: is_gl_funding

If the field "User filed2" contains the string "NY_GL_Funding", the conditions returns true.

2.2.3.10 Condition: is_mcc_relevant_change

Versions of trades are recognized by the same tradeGroupId. This conditions looks for previous versions of the trade that have been loaded successfully and does a field comparision. If a mcc-relevant filed has changed, it returns true.
The following fields are compared:
"currency", "price", "settlementDate", "tradeDate", "tradeType", "volume"

2.2.3.11 Condition: is_fx_option_forward

Shows if the trade type is "FX Option Forward ":

Product	InstrumentType	InstrSubType	TradeRole	RefInstrument
FX Option Forward	0	1	2	
FX Option Forward	0	1	3	

2.2.3.12 Condition: is_fx_drawdown

Shows if the trade type is "FX Drawdown ":

Product	InstrumentType	InstrSubType	TradeRole	RefInstrument

FX Drawdown	0	0	7	

2.2.3.13 Condition: is_new_record

The field "RecType" holds the information. If the value is "1", it is new trade.

2.2.3.14 Condition: is_history_record

The field "RecType" holds the information. If the value is "0", it is informational record that shows the history of a trade.

2.2.3.15 Condition: has_no_reuters_price

Sungard delivers market prices from Reuters. If the field "MarketRate" is unequal to zero, no Reuters price was available.

2.2.3.16 Condition: is_out_of_turnover_limit

The basis of this condition is the turnover. It is calculated as follows:

$$\frac{\left|("\text{NettoRate}" - "\text{MarketRate}") * "\text{Amount}"\right|}{"\text{FxRate}"}$$

If the turnover is greater than a defined limit, the condition is true.
The value "SUNGARD_TURNOUT_LIMIT" can be configured in the database.

2.2.3.17 Condition: is_out_of_reuters_price

An interval is created around the "MarketRate" using the tolerance values from the priceCheckCategory that is linked to the commodity of the trade (e.g. EUR, EUR-AED). If the "NettoRate" is inside of the interval, the condition is false, otherwise true.
See also section "Price/time thresholds".

2.2.3.18 Condition: is_bagatelle

The basis of this condition is the turnover. It is calculated as follows:

$$\frac{\left|("\text{NettoRate}" - "\text{MarketRate}") * "\text{Amount}"\right|}{"\text{FxRate}"}$$

If the turnover is smaller than a defined limit, the condition is true.
The value "SUNGARD_BAGATELLE_LIMIT" can be configured in the database.

2.3 Price request

2.3.1 Building a Bloomberg request

Bloomberg requests for FX trades have the form
<CURRENCY1><CURRENCY1> Curncy
Additionally a fieldname needs to be specified that indicates the forward rate depending on the maturity date.

Bloomberg requests for MM trades have the form
<CURRENCY>DR<MATURITY> Curncy

The currency code is Bloomberg specific and need to be translated from an ISO currency.
The maturity code is Bloomberg specific and need to be calculated from the maturity date.
See Appendix.

2.3.2 Data retrieval from Bloomberg

The Bloomberg data will be received from the ActiveX interface of the Bloomberg terminal. The license model requires that the Bloomberg data will not leave the terminal-PC. To ensure this, the data is saved in a flat file on the local terminal and an anonymous reference is saved in the server database.

The request-string together with all relevant price-check data (trade price, trade time, check type, check thresholds, etc) is sent to the client application. The request-string is passed to Bloomberg. The process is synchronously waiting for the response data.
The price is saved in a local file (to be configured by the user) together with an unique id, which is also saved in the server database to link the price to the corresponding trade.
The client performs the price-check and saves the result, but not the Bloomberg price, in the server database.
So the price data is only displayed and saved on the client-PC and the data is useless for anyone else, since no trade information is save on that client. Only if you have access to the database and your own profile (local price file) is configured correctly, you can read the prices you received and the connected trades.
Bloomberg time is London time, which is in general GMT+1!

2.4 Pricing checks

2.4.1 Processing

In the following step the received market prices are compared to the trade prices. The rules to calculate the state of the trade follow the same idea like above. For both "Fidessa" and "Omni" the rules are identical, and look like follows:

status_name	expression
No Bloomberg price	has_no_bloomberg_price
Bloomberg out of turn over limit	is_out_of_turnover_limit
Bloomberg price out of range	is_out_of_bloomberg_price
O.K.	

2.4.1.1 Condition: has_no_bloomberg_price

Bloomberg has not sent any market data for that trade.

2.4.1.2 Condition: is_out_of_turnover_limit

The basis of this condition is the turnover. The equation to calculate the turnover can be found above. If the turnover is greater than a defined limit, the condition is true.
The value " SUNGARD_TURNOUT_LIMIT" can be configured in the database.

2.4.1.3 Condition: is_out_of_bloomberg_price

An interval is created around the Bloomberg market price using the tolerance values from the priceCheckCategory that is linked to the commodity of the trade (e.g. EUR, EUR-AED). If the "NettoRate" is inside of the interval, the condition is false, otherwise true.
See also section "Price/time thresholds".

2.4.2 Price/time thresholds

Each commodity of Sungard is linked to a threshold. This threshold consists of a positive and a negative percentage price deviation and a time deviation in minutes.
Commodities of MM trades are currencies. Commodities of FX trades are currency pairs. Only currency pairs against USD need to be defined. Other cross currency pairs are generated from the corresponding USD pairs by summing the thresholds. These values are generated each time new data is processed.
By adding symbols for maturity days, these threshold may become maturity dependent.

3 Appendix

3.1 Bloomberg maturity codes

Name	Bloomberg code	Bloomberg field	Minimum Maturity days	Maximum Maturity days	Comment
1D	1T	PX_MID	0	1	Overnight
2D	2T	PX_MID	1	2	Second night
3D	3T	PX_MID	2	3	Third night
1W	1Z	PX_MID	3	10	1 week
2W	2Z	PX_MID	10	17	2 weeks
3W	3Z	PX_MID	17	24	3 weeks
4W	4Z	FWD_RT_1MO	24	29	4 weeks
1M	A	FWD_RT_1MO	29	45	1 month
2M	B	FWD_RT_2MO	45	74	2 months
3M	C	FWD_RT_3MO	74	105	3 months
4M	D	FWD_RT_4MO	105	136	4 months
5M	E	FWD_RT_5MO	136	166	5 months
6M	F	FWD_RT_6MO	166	197	6 months
7M	G	FWD_RT_7MO	197	228	7 months
8M	H	FWD_RT_8MO	228	260	8 months
9M	I	FWD_RT_9MO	260	292	9 months
10M	J	FWD_RT_10MO	292	325	10 months
11M	K	FWD_RT_11MO	325	355	11 months
1Y	1	FWD_RT_12MO	355	532	1 year
18M	1F	FWD_RT_18MO	532	562	18 months
2Y	2	FWD_RT_24MO	562	912	2 years
3Y	3	FWD_RT_24MO	912	1277	3 years
4Y	4	FWD_RT_24MO	1277	1650	4 years
5Y	5	FWD_RT_24MO	1650	2008	5 years
6Y	6	FWD_RT_24MO	2008	2374	6 years
7Y	7	FWD_RT_24MO	2374	2740	7 years
8Y	8	FWD_RT_24MO	2740	3105	8 years
9Y	9	FWD_RT_24MO	3105	3470	9 years
10Y	10	FWD_RT_24MO	3470	4565	10 years
15Y	15	FWD_RT_24MO	4565	6390	15 years

3.2 Bloomberg currency codes

ISO	Bloomberg	Comment
ADP	SP	ANDORRAN PESETA
AED	UD	UAE DIRHAM
AFA	AA	AFGHANISTAN AFGANI
ALL	AL	ALBANIAN LEK
AMD	AM	ARMENIA DRAM
ANG	AG	NETH. ANT. GUILDER
AOK	AK	ANGOLAN KWANZA
ARS	AP	ARGENTINE PESO
ATS	AS	AUSTRIAN SCHILLING
AUD	AD	AUSTRALIAN DOLLAR
AZM	AJ	AZERBAIJAN MANAT COMM.
AZS	AZ	AZERBAIJAN MANAT
BBD	BB	BARBADOS DOLLAR

BDT	BT	BANGLADESH TAKA
BEF	BF	BELGIAN FRANC
BES	BE	BELARUS RUBEL
BGL	BL	BULGARIAN LEV
BHD	BD	BAHRAINI DINAR
BIF	BU	BURUNDI FRANC
BMD	BM	BERMUDIAN DOLLAR
BND	BR	BRUNEI DOLLAR
BOP	BO	BOLIVIAN BOLIVIANO
BPS	BP	CANTON & ENDERBURY IS.
BRL	BC	BRAZIL REAL
BSD	US	BAHAMAS DOLLAR
BTN	IR	BHUTAN NGULTRUM
BWP	BW	BOTSWANA PULA
BYR	BY	BELARUS RUBEL COMM.
BZD	BZ	BELIZE DOLLAR
CAD	CD	CANADIAN DOLLAR
CFP	PF	FRENCH PACIFIC IS. FRANC
CHF	SF	SWISS FRANC
CLF	CF	CHILEAN U. FOMENTO
CLP	CH	CHILEAN PESO
CNY	CC	CHINA RENMINBI
COP	CL	COLOMBIAN PESO
CRC	CO	COSTA RICAN COLON
CSD		SERBIAN DINAR
CUP	CU	CUBAN PESO
CVE	CE	CAPE VERDE ESCUDO
CYP	CP	CYPRIOT POUND
CZK	CK	CZECH KORUNA
DEM	DM	GERMAN MARK
DJF	DF	DJIBOUTI FRANC
DKK	DK	DANISH KRONE
DOP	DP	DOMINICAN REPB.
DZD	AE	ALGERIAN DINAR
ECS	ES	ECUADORAN SUCRE
EEK	EK	ESTONIAN KROON
EGP	EP	EGYPTIAN POUND
ESP	SP	SPANISH PESETA
ETB	EB	ETHIOPIAN BIRR
EUR	EC	EUROLAND
FIM	FM	FINNISH MARKKA
FJD	FD	FIJI DOLLAR
FKP	BP	FALKLAND IS. POUND
FRF	FR	FRENCH FRANC
GBP	BP	BRITISH POUND
GES	GE	GEORGIA LARI
GHC	GC	GHANA CEDI
GIP	BP	GIBRALTAR POUND
GMD	GM	GAMBIAN DALASI
GNS	GN	GUINEA FRANC
GRD	GD	GREEK DRACHMA

GTQ	GQ	GUATEMALA QUETZAL
GWP	GB	GUINEA BISSAU PESO
GYD	GY	GUYANA DOLLAR
HKD	HD	HONG KONG DOLLAR
HNL	HL	HONDURAS LEMPIRA
HRK	HR	CROATIAN KUNA
HTG	HG	HAITI GOURDE
HUF	HF	HUNGARIAN FORINT
IDR	IH	INDONESIAN RUPIAH
IEP	IP	IRISH PUNT
ILS	IS	ISRAELI SHEKEL
INR	IR	INDIAN RUPEE
IQD	IQ	IRAQI DINAR
IRR	ID	IRANIAN RIAL
ISK	IK	ICELAND KRONA
ITL	IL	ITALIAN LIRA
JMD	JA	JAMAICA DOLLAR
JOD	JD	JORDANIAN DINAR
JPY	JY	JAPANESE YEN
KES	KS	KENYAN SHILLING
KHR	KH	CAMBODIA RIEL
KMF	KM	COMOROS FRANC
KPW	NW	NORTH KOREAN WON
KRW	KW	SOUTH KOREAN WON
KTS	KT	KAZAKHSTAN TENGE
KWD	KD	KUWAITI DINAR
KYD	CY	CAYMAN ISLANDS
KYS	KY	KYRGYZSTAN SOM
LAK	LK	LAOS NEW KIP
LBP	LP	LEBANESE POUND
LKR	SL	SRI LANKAN RUPEE
LRD	US	LIBERIAN DOLLAR
LSM	LL	LESOTHO LOTI
LTT	LH	LITHUANIAN LITA
LUF	LF	LUXEMBOURG FRANC
LVL	LT	LATVIAN LAT
LYD	LB	LIBYAN DINAR
MAD	MD	MOROCCAN DIRHAM
MGF	MG	MADAGASCAR FRANC
MMK	BK	MYANMAR KYAT
MNT	MT	MONGOLIA TUGRIK
MOP	MC	MACAU PATACA
MRO	MO	MAURITANIA OUGUIYA
MTL	ML	MALTESE LIRA
MUR	MA	MAURITIUS RUPEE
MVR	??	MALDIVE IS. RUFIYA
MVS	MV	MOLDOVA LEI
MWK	MW	MALAWI KWACHA
MXN	MP	MEXICAN PESO
MYR	MR	MALAYSIAN RINGGIT
MZM	MM	MOZAMBIQUE METICAL

NAD	NM	NAMIBIA DOLLAR
NGN	NN	NIGERIA NAIRA
NIC	NC	NICARAGUA CORDOBA
NLG	DG	DUTCH GUILDER
NOK	NK	NORWEGIAN KRONE
NPR	NP	NEPAL RUPEE
NZD	ND	NEW ZEALAND DOLLAR
OMR	OR	OMANI RIAL
PAB	PB	PANAMANIAN BALBOA
PEN	PS	PERUVIAN NEW SOL
PGK	PK	PAPUA N. G. KINA
PHP	PP	PHILIPPINES PESO
PKR	PR	PAKISTANI RUPEE
PLN	PZ	POLISH ZLOTY
PTE	PE	PORTUGUESE ESCUDO
PYG	PG	PARAGUAY GUARANI
QAR	QR	QATARI RIYAL
ROL	RL	ROMANIAN LEU
RUB	RR	RUSSIAN RUBLE
RWS	RW	RWANDA FRANC
SAR	SR	SAUDI RIYAL
SBD	SI	SOLOMON IS. DOLLAR
SCR	SE	SEYCHELLES RUPEE
SDD	SU	SUDANESE POUND
SDR	SD	SPECIAL DRAWING RIGHTS
SEK	SK	SWEDISH KRONA
SGD	SD	SINGAPORE DOLLAR
SHP	BP	ST. HELENA POUND
SIT	SX	SLOVENIA TOLAR
SKK	VK	SLOVAKIA KORUNA
SLL	SN	SIERRA LEONE LEONE
SOS	SS	SOMALI SCHILLING
SRG	SG	SURINAM GUILDER
STD	ST	SAO TOME DOBRA
SVC	SV	EL SALVADOR COLON
SYP	SY	SYRIAN POUND
SZL	SZ	SWAZILAND LILANGENI
TBO	TB	THAI BAHT
THB	TB	THAI BAHT
TJS	TJ	TAJIKISTAN RUBLE
TMM	TM	TURKMENISTAN MANAT
TND	TD	TUNISIAN DINAR
TOP	TG	TONGA PA'ANGA
TPE	??	EAST TIMOR ESCUDO
TRL	TL	TURKISH LIRA
TTD	TT	TRINIDAD/TOBAGO DOLLAR
TWD	TR	TAIWAN DOLLAR
TZS	TP	TANZANIAN SHILLING
UAH	UK	UKRAINE HRYVNA
UGX	UG	UGANDAN SHILLING
USD	US	US DOLLAR

UYP	UP	URUGUAY PESO
UZS	UZ	UZBEKISTAN SUM
VEB	VB	VENEZUELAN BOLIVAR
VND	VD	VIETNAM DONG
VUV	VV	VANUATU VATU
WST	WS	SAMOA (WEST) TALA
XAF	XF	CENT. AFR. REPUB.
XCD	XD	EAST CARRIBBEAN DOLLAR
XDS	XD	ST. CHRISTOPHER DOLLAR
XEU	EC	EURO. CURR. UNIT
YDD	YD	YEMENI DINAR
YER	YR	YEMENI RIAL
YUN	YG	YUGOSLAVIAN DINAR
ZAR	SA	S. AFRICAN RAND
ZMK	ZK	ZAMBIAN KWACHA
ZRZ	ZZ	ZAIRE ZAIRE
ZWD	ZD	ZIMBABWE DOLLAR
KZT	KT	KAZAKHSTAN
BGN	BL	BULGARIA
LTL	LT	LITHUANIA
XAG	??	SILVER
XAU	??	GOLD
XOF	??	XOF
XPD	??	XPD
XPT	??	XPT