SWXess

Accrued Interest Calculations and Determination of Holiday Calendars

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Table of Contents

1 Introduction

This brief document covers the accrued interest calculation methods supported by SIX Swiss Exchange and gives the SWXess interpretation of the International Capital Market Association (ICMA) rules. Because the determination of holiday calendars is so important to the correct calculation of accrued interest, the way this is carried out in SWXess is covered below.

2 Terms and Abbreviations

The definitions in the table below should be read in conjunction with the following figure.

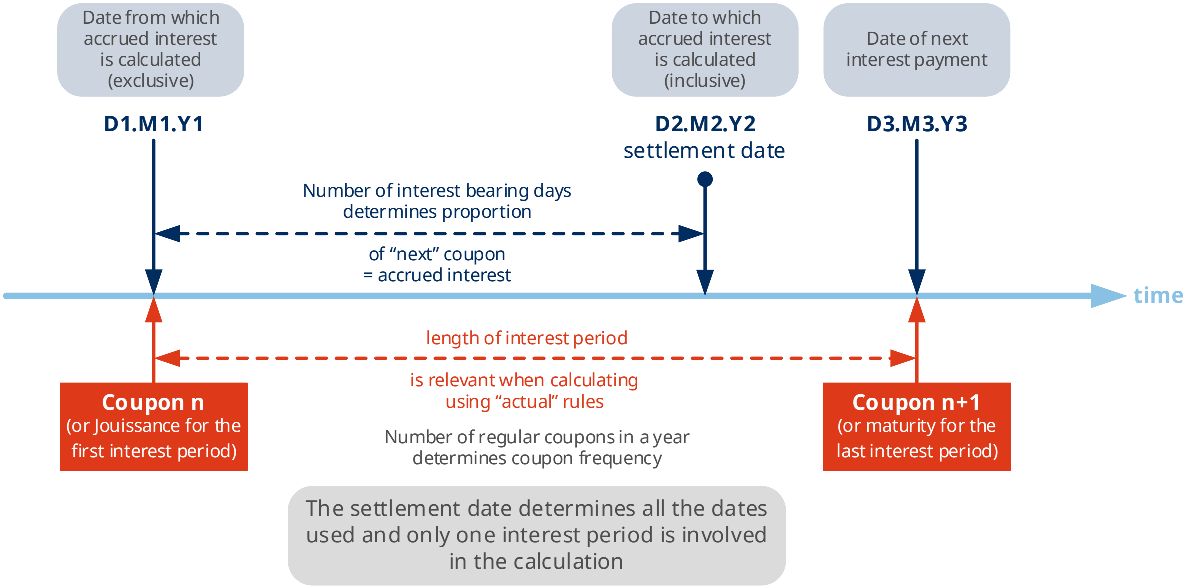


Figure 1: Definitions

Term/Abbreviation	Explanation
accrued interest	The accrued interest represents the proportion of the coupon amount to which the seller is entitled. The basis of the calculation is the assumption that the buyer receives the full coupon payment and must pay the seller that part of the coupon representing the period between the previous coupon payment and the settlement date
coupon frequency	The number f (regular) coupon payments in a year
CSD	Central Securities Depository
D1.M1.Y1	The date from which accrued interest is calculated
D2.M2.Y2	The date to which accrued interest is calculated
D3.M3.Y3	The date of the next relevant interest payment
date ranges	Where the actual number of days between two dates as per calendar is required, the earlier date is excluded from the range and the later date is included. By convention, bonds are “ex coupon” on the interest payment date
FRN	Floating Rate Note
Jouissance	The first date of interest entitlement
Liberierung	First date on which a bond trade can be settled: the date on which subscription payments are due
maturity	The last date of interest entitlement
settlement date	The date on which the trade will be settled
SWIFT method of interest computation indicator	https://www.iso20022.org/15022/uhb/mt564-18-field-22f.htm
trade date	The date on which the trade took place

3 Accrued Interest Methods Supported by SWXess

SWXess supports the following day count methods for the purposes of accrued interest calculations. The two ICMA-99 methods only differ in their handling of coupon dates: otherwise they are the same.

NB: Throughout, where the actual number of days between two dates as per calendar is required**, the earlier date is excluded** from the range and **the later date is included**. In most cases the earlier date is an interest payment date and represents a day on which a coupon has already been detached (and so should not be counted towards accrued interest). The number of days can be simply calculated as the difference between two date values on most computer systems.

Day Count Method **[ISO 20022 keyword in field :22F::MICO//aaaa]**	**Basic Rule for Determining Number of Interest Bearing Days (see section 4.3)**	**Basic Rule for Determining the Length of a "Year" (see section 4.4)**	**Remarks**
Flat (No Accrued Interest) [A000]	–	–	no accrued interest
German (30/360) [A011][1]	30 days/month	360 days/year	This is the method currently used in the Swiss marketplace
Special German (30S/360) [A007][2]	30 days/month, except for February which is 28 or, in leap years, 29 days	360 days/year	This is the method formerly used in the Eurobond markets
English (Actual/365) [A005]	days/month as per calendar	365 days/year	
French (Actual/360) [A004]	days/month as per calendar	360 days/year	
US (30U/360) [A001]	30 days/month, US variant	360 days/year	This is the 30/360 day count method typically used in the US
ISMA-Year (Actual/365L) [A009]	days/month as per calendar	365 or 366 days/year	The number of days/year used depends on the coupon frequency and whether a leap year is involved
ISMA-99 Normal (Actual/Actual) [A006] ISMA-99 Ultimo (Actual/Actual) [A010]	days/month as per calendar	days/year as per calendar (based on interest period length)	These methods apply to issues in the Eurobond markets since 1999 (hence the names). See 6.1 for a more detailed discussion of the two ISMA-99 methods. Note that the ISMA-99 rules given in this document are the **SWXess interpretation** of the ISMA rules, and cover exceptional cases not fully addressed by those rules – this can mean that the accrued interest calculated by SWXess may differ from that calculated in other markets under exceptional circumstances

[1] Using the SWIFT ISO 20022 definition of the *Eurobond basis model 3*, the SWXess *German* method should be given as A013.

[2] Using the SWIFT ISO 20022 definition of the *30/360 (basic rule)*, the SWXess *Special German* method should be given as A011.

4 Calculation of Accrued Interest

The calculation of the accrued interest amount for a particular trade date proceeds as follows:

– Determination of the settlement date
– Determination of the date of the previous coupon payment
– Determination of the number of days for which interest is to be accrued
– Calculation of the accrued interest

4.1 Determination of the Settlement Date

The settlement date for spot trades in a security for a particular trade date is determined using:

– The defined settlement cycle for the security (e.g. T+2, which means that the settlement date is the trade date plus two 'business' days).
– The (so-called) weekend day calendar
– The date upon which subscription payments are due ("Liberierung")

When counting days forward from the trade date to determine the settlement date, all non-business days are skipped. For these purposes, a business day is defined as a weekday on which the nominal currency has no holiday. This can be determined using the settlement currency holiday calendar for the security in question[3].

If the trade date falls on a relevant currency holiday for the security, the settlement cycle is not extended by a day, as 'T' is not part of the settlement cycle. However, if interest needs to be calculated for the same instrument for a trade with an execution date immediately prior to the that 'T' day, then the currency holiday will be considered. Business holidays (other than weekends) are not considered here, thus it is important to distinguish between the Market- and the Currency-Holiday calendars.

If the calculated settlement date for a security is earlier than “Liberierung”, then “Liberierung” is used.

If one of the following conditions is true, there is **no** accrued interest:

– The settlement date is earlier than or falls on the first date of interest entitlement ("Jouissance")
– the settlement date falls on an interest payment date
– the settlement date is later than or equal to the maturity date
– the instrument is not traded in percent
– no settlement date was agreed for the trade
– The requested settlement date is not within the instrument's communicated settlement cycle
– The “null” day count method is selected.

4.2 Determination of Accrued Interest Dates

The date from which accrued interest is calculated **(D1.M1.Y1)**

– is the date of the start of the interest period within which the **settlement date** falls.

The date to which accrued interest is calculated **(D2.M2.Y2)** is by default the **settlement date**, unless it is later than or equal to the maturity date of the bond, in which case D2.M2.Y2 is set to the maturity date.

For the ISMA-Year, ISMA-99 Normal and ISMA-99 Ultimo day count methods, it is necessary to use the next relevant interest payment date **(D3.M3.Y3)** in the calculation. This is defined as follows:

[3] SIX Swiss Exchange no longer calculates interest for trades in bonds with differing nominal and settlement currencies, so for the purposes of this document, these two terms are the same.

- For the ISMA-Year day count method, D3.M3.Y3 is defined as the next interest payment date following D1.M1.Y1[4]
- For the ISMA-99 Normal and ISMA-99 Ultimo day count methods, D3.M3.Y3 is defined as the coupon payment date for the interest payment period within which the **settlement date** falls, or maturity if the settlement date is later than or equal to the maturity date of the bond[5].

Thus the appropriate interest payment period record in each case is the one where the settlement date is equal to or later than the start of interest period, and earlier than the relevant coupon's payment date.

Note that if changes to security reference data occur in the interval between the trade date and the settlement date, the values valid on the date the trade was processed are those that are used.

4.3 Determination of Number of Interest-bearing Days

The dates D1.M1.Y1 (start date) and D2.M2.Y2 (end date) define the period over which interest is accrued. The number of interest-bearing days depends on the day count method defined for the bond in question.

Day Count Method	Details	Number of Interest-Bearing Days, N
German (30/360)	30 days/month	**N = (D2 – D1) + 30 * (M2 – M1) + 360 * (Y2 – Y1)** This method requires special handling for D1 or D2 for months with 31 days and for February: – If D1 or D2 is 31, then use the value 30 instead. Thus, on the 31st of a month the number of accrued interest days is the same as that on the 30th. – The last day of February is treated as the 30th day of the month.
Special German (30S/360)	30 days/month, except for February which is 28 or, in leap years, 29 days	**N = (D2 – D1) + 30 * (M2 – M1) + 360 * (Y2 – Y1)** This method requires special handling for D1 or D2 for months with 31 days: – If D1 or D2 is 31, then use the value 30 instead. Thus, on the 31st of a month the number of accrued interest days is the same as that on the 30th. – The last day of February is not treated specially.
English (Actual/365)	days/month as per calendar	**N = number of days between D1.M1.Y1 and D2.M2.Y2**
French (Actual/360)	days/month as per calendar	**N = number of days between D1.M1.Y1 and D2.M2.Y2**
US (30U/360)	30 days/month, US variant	**N = (D2 – D1) + 30 * (M2 – M1) + 360 * (Y2 – Y1)** This method requires special handling for D1 or D2 for months with 31 days and for February. The following rules are applied in the following order: – if D2 is the last day of February (28 in a non-leap year; 29 in a leap year) and D1 is the last day of February, change D2 to 30 – if D1 is the last day of February, change D1 to 30 – if D2 is 31 and D1 is 30 or 31, change D2 to 30 – if D1 is 31, change D1 to 30
ISMA-Year (Actual/365L)	days/month as per calendar	N = number of days between D1.M1.Y1 and D2.M2.Y2
ISMA-99 Normal (Actual/Actual) **ISMA-99 Ultimo** (Actual/Actual)	days/month as per calendar	N = number of days between D1.M1.Y1 and D2.M2.Y2

[4] D3.M3.Y3 is thus the coupon payment date for the InterestPayment record starting with D1.M1.Y1.

[5] Note that it is not necessary to search for a new InterestPayment record if D2.M2.Y2 is equal to or later than D1.M1.Y1 and earlier than the coupon payment date for the InterestPayment record starting with D1.M1.Y1. In these cases, both D1.M1.Y1 and D2.M2.Y2 fall in the same interest period, and D3.M3.Y3 is simply equal to the coupon payment date for the selected InterestPayment record.

4.4 Calculation of the Basic Accrued Interest Amount

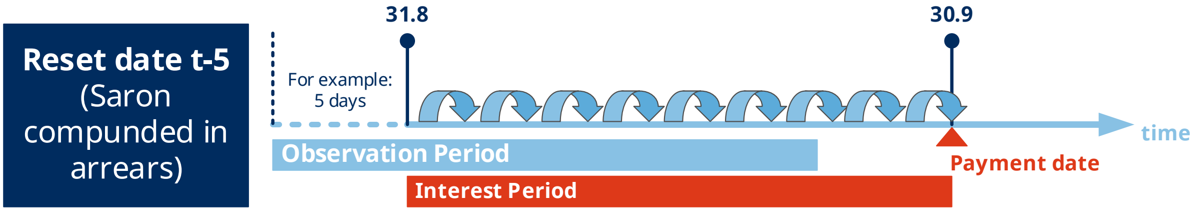
Day Count Method	Details	Basic Accrued Interest Amount, A (F = annual coupon frequency; N = number of interest-bearing days)
German (30/360)	360 days/year	A = coupon amount * (N / 360)
Special German (30S/360)	360 days/year	A = coupon amount * (N / 360)
English (Actual/365)	365 days/year	A = coupon amount * (N / 365)
French (Actual/360)	360 days/year	A = coupon amount * (N / 360)
US (30U/360)	360 days/year	A = coupon amount * (N / 360)
ISMA-Year (Actual/365L)	365 or 366 days/year	A = coupon amount * (N / Y) where Y is given by the following: – If the coupon frequency is annual, then Y is 366 if the 29 February is included in the interest period, else Y is 365[6]. – If the coupon frequency is not annual, then Y is 366 for each interest period where D3.M3.Y3 falls in a leap year, else Y is 365.
ISMA-99 Normal (Actual/Actual) **ISMA-99 Ultimo** (Actual/Actual)	days/year as per calendar (based on interest period length)	See section 6.1 for full details and examples of the ISMA-99 methods and for a detailed definition of “regular” and “periodic”. The only difference between the two ISMA-99 methods is the assumption made about when regular coupons fall: – The ISMA-99 Normal method assumes that regular coupons always fall on the same day of the month where possible – The ISMA-99 Ultimo method assumes that regular coupons always fall on the last day of the month. Where the coupon period is regular (by definition, this only applies to periodic coupon frequencies): **A = (coupon amount / F) * (N / C)** where **C** = number of days between D1.M1.Y1 and D3.M3.Y3. For aperiodic coupon frequencies, and in irregular interest periods, the approach used is to divide the interest period into notional interest periods. Normally the notional periods are generated backwards from D3.M3.Y3, but if D3.M3.Y3 equals the maturity date, then the notional periods are generated forwards from D1.M1.Y1: – For aperiodic coupon frequencies, the notional interest periods are 12 months long, and the applicable coupon frequency **F’** is 1. – For irregular interest periods with a periodic coupon frequency, the notional interest periods are [12/F] months long, and the applicable coupon frequency **F’** is F. The basic accrued interest amount is given by the following formula: **A = (coupon amount / F’) *** $\sum_i (N_i / C_i)$ where **F’** is the applicable coupon frequency, N_i is the number of days of accrued interest falling into period **i**, and C_i = the length of period i in days.

[6] Note that for regular annual periods this rule is equivalent to counting the actual number of days between D1.M1.Y1 and D3.M3.Y3**.** Only where this value is neither 365 nor 366 (note that it is possible to have non regular periods regardless of day count method), is it necessary to search the interest period from D1.M1.Y1 (**ex**clusive) to D3.M3.Y3 (**in**clusive) for an occurrence of 29 February. If one is found, then **Y** is set to 366, else **Y** is set to 365.

5 Accrued Interest for Floating Rate Notes based on SARON

SARON, the Swiss Average Rate Overnight, is the replacement for the London Interbank Offered Rate (LIBOR), the measure of the average rate at which banks are willing to borrow unsecured funds. SARON is calculated from SIX's repo market using a volume-weighted average of transactions and binding quotes.

Whereas all other accrued interest methods in SWXess are 'forward-looking' (the interest payments can be set at the beginning of the interest period), to accurately use compounded SARON as a FRN benchmark, it is best when used in arrears, i.e. 'backward looking'. This is because the interest payments are based on real-time market activity. Consequently, for trades in SARON FRNs, the applicable rate of accrued interest will not be known at the start of the coupon period and to enable SARON rates to be used for the entire interest period covered by a trade (for which rates are needed up to the T+2 settlement date), the values of SARON to be used will need to be taken from an observation period of rates which precedes both the start and end of the trade's actual dates by five business days, as shown below:



This change in methodology and the requirements to follow trading practice in the swaps markets leads to the following changes in the calculation of accrued interest for floating rate notes:

– The calculation of accrued interest for FRNs is only available for listed Swiss franc bonds;
– A Modified Business Day Convention must be defined for all Swiss franc FRNs;
– The Actual/360-day count method will be used;
– The issuer may define a margin which is to be added to the calculated compounded interest rate;
– A common length of Observation Period 'look-back' will be used for all Swiss-franc FRNs;
– The applied interest rate will be compounded;
– The overall interest rate will be floored, to avoid any negative cash flow.

The existing Currency Holiday calendar for Swiss Francs published on the SIX website can be used as a proxy for the days on which a new SARON rate will set.

For SARON bonds only, the field *Interest Rate* in the Reference Data Interface (RDI) will convey the margin rate of the bond and not its underlying interest rate (as that is unknown at the time of publication).

6 The ISMA-99 Methods

6.1 Details of the ISMA-99 Methods

The ISMA-99 methods make a distinction between regular and irregular interest periods:

– A **regular** interest period is always an exact multiple of a number of months long

  Determining for the accrued interest calculation whether the coupon period in question is regular or not is carried out by comparing the length of the period between D1.M1.Y1 and D3.M3.Y3 with the length of a single regular interest period as implied by the coupon frequency [7].

  The basic accrued interest amount for regular interest periods is given by:

  A =(coupon amount / F) * (N / C)

  where **C** = number of days between D1.M1.Y1 and D3.M3.Y3.

– For irregular interest periods, it is necessary to generate "notional" interest periods. The interest-bearing days are then spread over the notional periods, each with an appropriate daily accrual rate. In irregular coupon periods, the daily accrued interest rate is not necessarily constant throughout the period, but "jumps" in value at each notional coupon date.

  Notional interest periods are normally generated by counting backwards from the next coupon date (D3.M3.Y3). For irregular last coupons however, where D3.M3.Y3 is equal to the maturity date, the notional periods count forwards from the date from which accrued interest is calculated (D1.M1.Y1). The reason for this approach is that it aligns the notional periods with actual interest payment dates for most known bonds (generally speaking only the first and last interest periods are irregular, if at all). The start date for the notional periods (D3.M3.Y3 or D1.M1.Y1) is termed the anchor date below.

  For each new notional period, the start date is always calculated with reference to the anchor date by counting in multiples of the notional interest period length, and not by counting from each newly calculated date. This avoids systematic "drift" in the dates.

  SWXess makes a distinction between **periodic** and **aperiodic** coupon frequencies, as follows:

  SWXess only recognizes coupon frequencies **F** of 1x, 2x, 3x, 4x, 6x, and 12x per year as **periodic** (where F >= 1 and INT[12/F] = [12/F]). In these cases, each regular interest period is always an exact number of months long.

  For periodic coupon frequencies where the interest period is irregular, notional interest periods are generated at intervals of [12/F] months, and the applicable coupon frequency **F'** is F.

– For all other, **aperiodic**, coupon frequencies (where F < 1 or INT[12/F] ≠ [12/F]) each interest period is always regarded as irregular.

  Notional interest periods are generated at yearly intervals, using the same date in the year as the anchor date, and substituting 28 February if the anchor date is 29 February where necessary. The applicable coupon frequency F' is 1.

The basic accrued interest amount for irregular interest periods is given by:

$A = (\text{coupon amount} / F') * \sum_i (N_i / C_i)$

where **F'** is the applicable coupon frequency, $\mathbf{N_i}$ is the number of days of accrued interest falling into period **i**, and $\mathbf{C_i}$ = the length of period **i** in days.

The two ISMA-99 methods only differ in their handling of coupon dates, as follows:

– ISMA-99 Normal

  Regular coupons are all assumed to fall on the same day in the month, at exact monthly intervals, where possible. Otherwise, where the given date does not exist (e.g., 31 June), the last day in the given month is used. If the interest period concerned (D1.M1.Y1 to D3.M3.Y3) does not meet these criteria, it is regarded as irregular, requiring the generation of notional interest periods.

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[7] The coupon frequency must be periodic: note that SWXess only recognizes coupon frequencies F of 1x, 2x, 3x, 4x, 6x, and 12x per year as periodic (see definition on this page)

When notional interest periods are generated, the same day in the month is used, where possible. Otherwise, the last day in the given month is substituted.

– ISMA-99 Ultimo

Regular coupons are all assumed to fall on the last day in the month, at exact monthly intervals. Otherwise, the interest period concerned (D1.M1.Y1 to D3.M3.Y3) is regarded as irregular, requiring the generation of notional interest periods. Note that the "ISMA-99 Ultimo" method only makes sense when regular coupons always fall at the end of a month.

When notional periods are generated, the last day in the given month is always used, even if D3 is less than 28.

When it is unclear from the prospectus or other information available to SWXess which of the two methods is appropriate and the regular coupons fall on the last day in the month, then SWXess will assume that the ISMA-99 Ultimo method applies, otherwise the ISMA-99 Normal method will be assumed.

6.2 ISMA-99 Examples

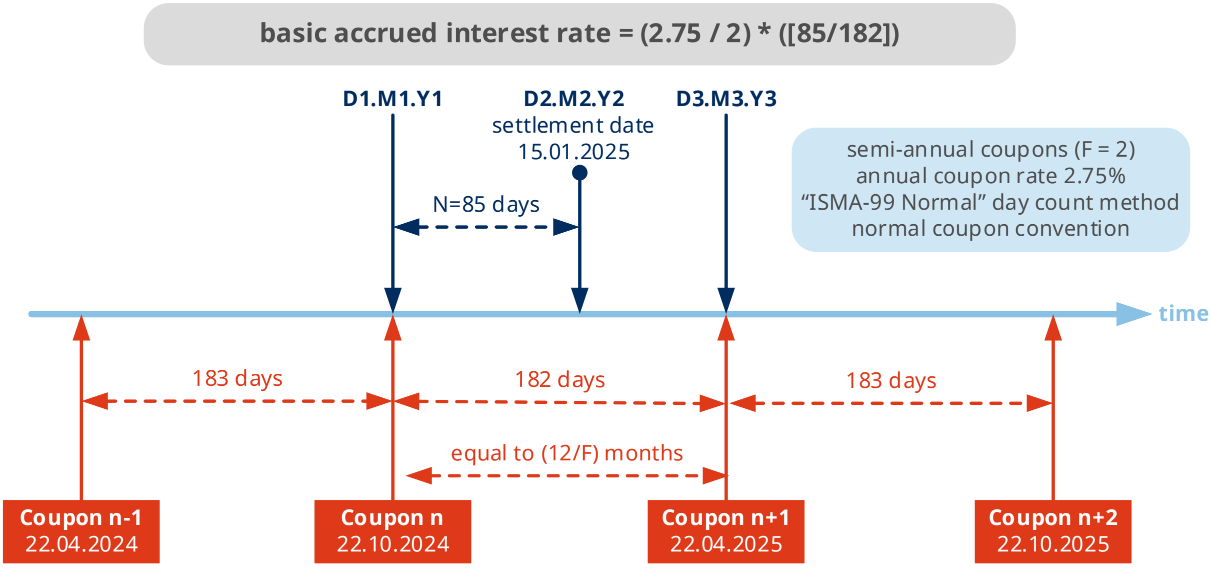

Figure 2: Example of regular interest period with semi-annual coupon payments

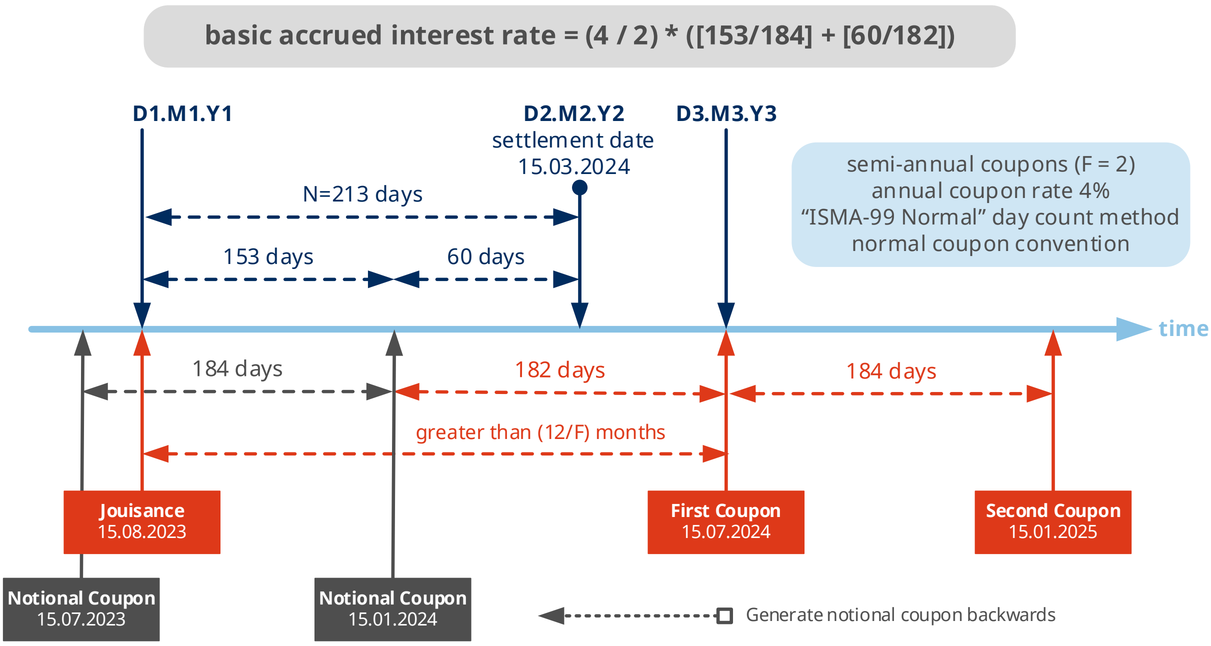

Figure 3: Example of irregular (long) initial interest period with semi-annual coupon payments

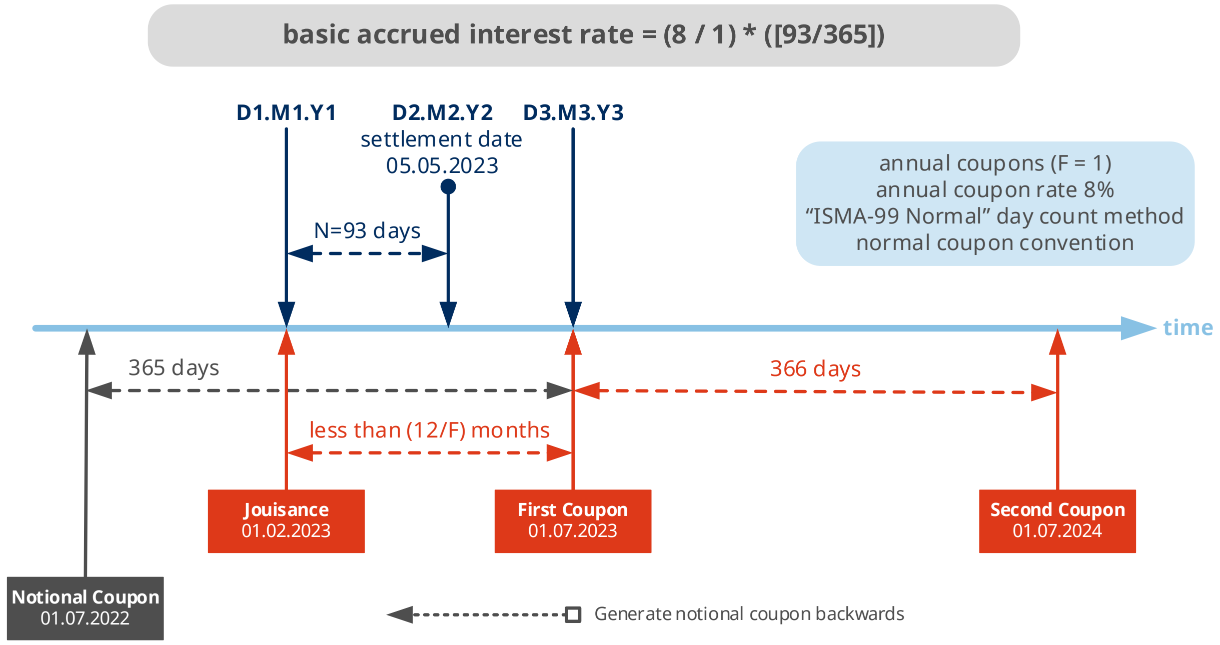

Figure 4: Example of irregular (short) initial interest period with annual coupon payments

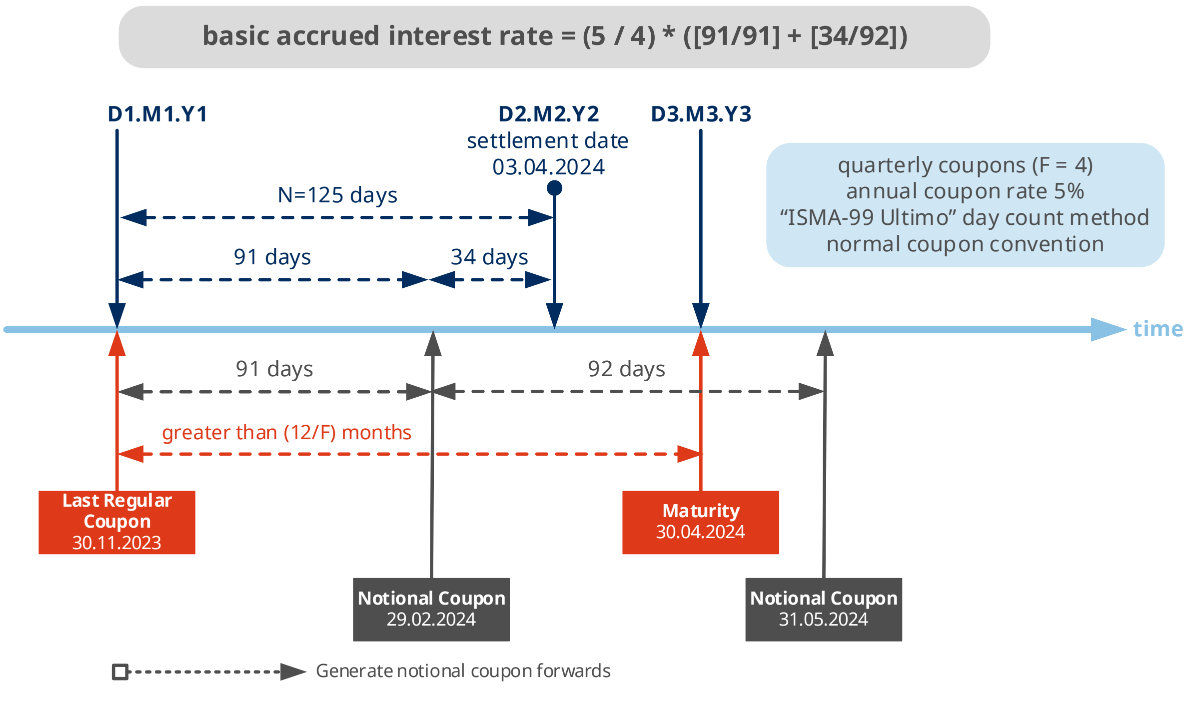

Figure 5: Example of irregular (short) final interest period with semi-annual coupon payments

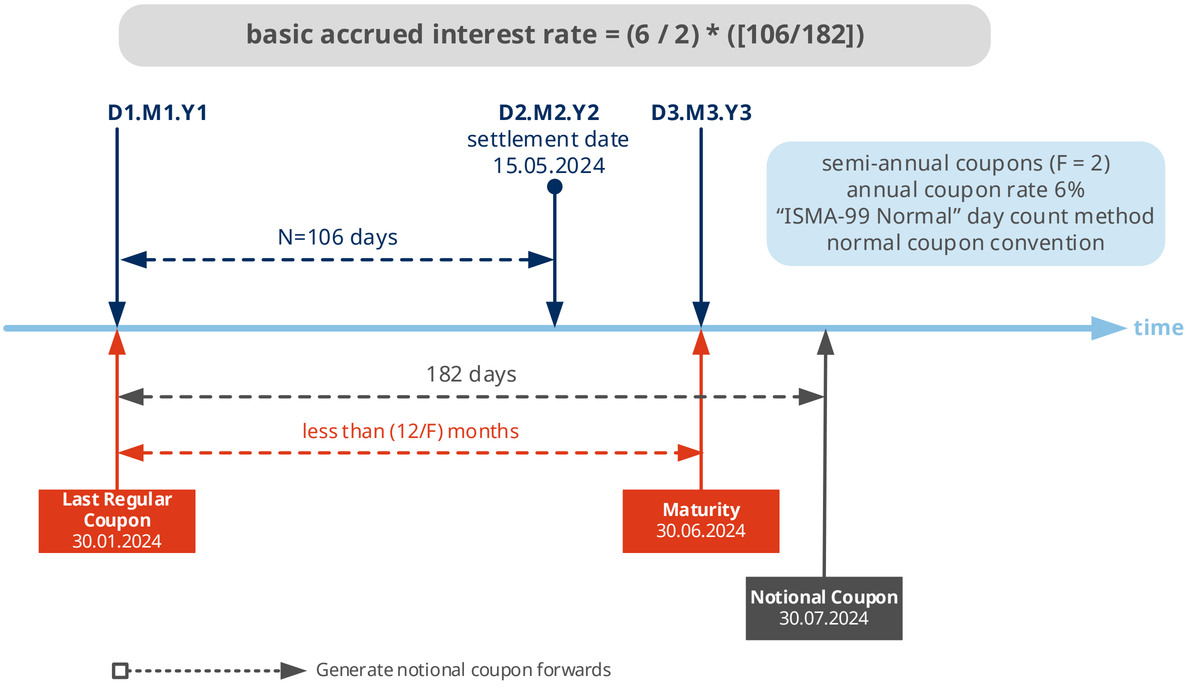

Figure 6: Example of irregular (short) final interest period with semi-annual coupon payments

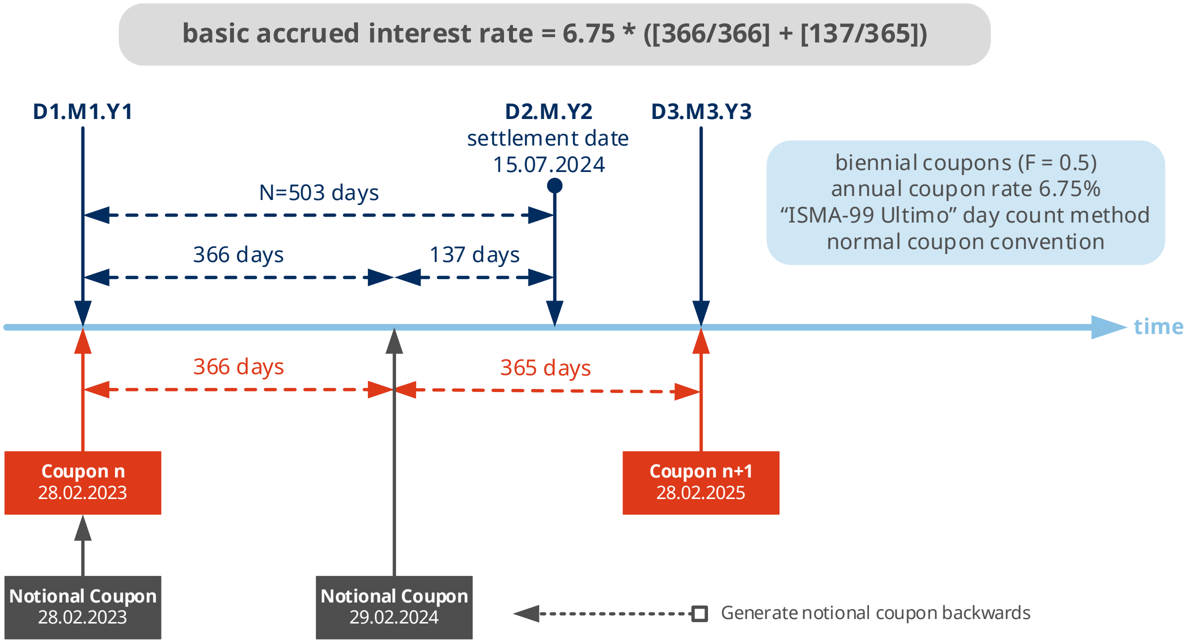

Figure 7: Example of aperiodic interest period with biennial coupon payments

7 Determination of Holiday Calendars

7.1 Introduction

The SWXess Platform uses a combination of different holiday calendars when counting business days forward from the trade date.

- The **Weekend Day** calendar
- The relevant settlement **Currency Holiday** calendar for the security in question

A given day is regarded as a *non-business day* for the settlement of a given security if it is contained in *either* of the relevant calendars given above. Note that the Market Holiday calendar (when trading is possible) is *not relevant* for the purpose of determining the settlement date.

When counting days forward from the trade date to determine the settlement date, all non-business days are skipped.

7.2 Weekend Day Calendar

There is only one Weekend Day calendar, which only contains weekends.

7.3 Currency Calendars

Each currency in which instruments can be traded on and settled from the SWXess Platform has a defined currency holiday calendar. The *settlement* currency is relevant for the security in question.

The intention of the Currency Holiday calendar is to define on which days it is not possible to make a cash settlement in the currency in question. Since settlement of most currencies is carried out in the central bank system of the country in question, the holiday calendar is generally defined by the central bank, but there are exceptions.

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