EUROPEAN CENTRAL BANK

EUROSYSTEM

AnaCredit plausibility checks

Plausibility checks performed on AnaCredit datasets

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Contents

1 Introduction

This document sets out the AnaCredit plausibility checks. These aim to identify AnaCredit data that are likely to be incorrect and hence have to be verified. Together with the validation checks, they constitute the data quality assurance of granular reporting on credit for AnaCredit. The distinction between validation checks and plausibility checks is that the former identify data which are definitely incorrect, while the latter identify data that are likely to be so.

The validation checks ensure overall compliance with the data model as defined in the AnaCredit Regulation;[1] they ensure data submissions are complete and technically correct (e.g. by highlighting missing attributes) and are already well incorporated in the regular data collection process. The introduction of plausibility checks ensures that AnaCredit data are of sufficient quality to serve the purposes for which the data have been collected.

This document consists of two sections. After this Introduction, Section 2 describes plausibility checks in general, discusses their features and presents their various different categories. Section 3 sets out the AnaCredit external plausibility checks in detail.

Please note that the ECB and NCBs may perform additional plausibility checks not mentioned in this document.

[1] Regulation (EU) 2016/867 of the European Central Bank of 18 May 2016 on the collection of granular credit and credit risk data (OJ L 144, 01.06.2016, p. 44).

2 Plausibility checks

2.1 Definitions

Data quality checks consist of a set of conditions. Violation of a condition indicates data which need to be verified, as they almost certainly do not comply with the requirements set out in the AnaCredit Regulation. The ECB principles for harmonised data quality assessment of granular reporting distinguish two main types of checks: validation checks and plausibility checks.[2] Together, these constitute the AnaCredit data quality assurance of granular reporting.

Validation checks are conditions that must be satisfied to meet the AnaCredit requirements, e.g. the settlement date of an instrument cannot be earlier than its inception date. The validation checks are published on the ECB website and ensure that the information registered complies with the AnaCredit data model. They also make it possible to identify data that are logically compliant with the AnaCredit data model, but methodologically inconsistent. Whenever validation checks are not satisfied, data are almost certain to be incorrect and revision will be required.

Even where data pass all the validation checks, they may still not fully comply with the requirements set out in the AnaCredit Regulation; these only impose a minimum set of conditions that must be satisfied to adhere to the data model. Further, data reported to be compliant with the data model are not necessarily correct or complete. For instance, validation check CN0010 requires the inception date to be less than or equal to the settlement date, but it does not ensure that either of the two is correct. Given the limited scope of self-contained rules in the AnaCredit requirements, additional plausibility checks are needed to further identify incorrect or incomplete data.

The introduction of the plausibility checks attempts to narrow this gap. They are conditions which, if violated, help to identify data that may not have been reported according to the requirements set out in the AnaCredit Regulation and are hence likely to be incorrect.

As an intuitive example of an external plausibility check, if AnaCredit data do not match the data collected under the BSI Regulation[3] (referred to below as “BSI data”), this provides an indication that the AnaCredit data are likely to be incorrect.

However, even if a condition to which a plausibility check refers is violated, it is still possible that the relevant AnaCredit data may be correct. To stay with the previous example, there are three different situations that may generate a discrepancy between BSI data and AnaCredit data. First, where the data reported to AnaCredit are erroneous and require revision; second, where the AnaCredit data are correct but the

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2 See Data quality assurance of granular reporting for more information about the principles for a harmonised data quality assessment.

3 Regulation (EU) 2021/379 of the European Central Bank of 22 January 2021 on the balance sheet items of credit institutions and of the monetary financial institutions (ECB/2021/2) (OJ L 73, 03.03.2021, p. 16).

BSI data have not been reported correctly; third, where methodological differences in the requirements of the two datasets justify the discrepancy.

Like validation checks, each plausibility check is documented by means of:

(a) a plausibility check identifier: a unique code identifying the specific check;

(b) a definition: an algorithm applied to the dataset(s) involved to establish and evaluate the condition;

(c) a description: a short explanation of logic underpinning the algorithm, including reference to the data attributes employed.

2.2 Classification

Plausibility checks fall into two main categories:

1. Internal plausibility checks: these are designed to identify implausible data based exclusively on the information provided in AnaCredit, be it in a single attribute, across different attributes, across different observed agents (sometimes referred to as "OAs"), or across time. Internal plausibility checks are further organised into two sub-categories:

   (a) internal plausibility checks per observed agent, which assess the plausibility of the data by checking consistency within and across data attributes;

   (b) internal plausibility checks across observed agents, which assess the plausibility of the data by checking consistency of the data of one observed agent with those of other observed agents.

2. External plausibility checks: these are designed to identify implausible data based on information provided in AnaCredit by comparing them with information provided in other datasets.

Figure 1 below illustrates how the general AnaCredit plausibility checks are organised.

Figure 1
Types of AnaCredit plausibility check

		Structure	Stability
Internal plausibility	per OA	Consistency within or across attributes	Time consistency of aggregate metrics
	across OAs	Consistency with data of other OAs	Changes in relative position compared to other OAs
External plausibility	Benchmark comparisons	Consistency with statistical and/or supervisory reporting	Consistency of ratios over time

2.2.1 Internal plausibility checks

Internal plausibility checks are self-contained within the AnaCredit data set, i.e. the conditions only refer to AnaCredit data as reported by one or more reporting agents.

Internal plausibility checks assess the conceptual consistency of the AnaCredit dataset within itself. They are further divided based on whether the check includes data related to a single reference date (structure category) or multiple dates (stability category), and whether the check uses data from the observed agent alone (i.e. within observed agent) or from multiple observed agents (i.e. across observed agents). Four classes can therefore be defined (see **Figure 1** above):

- Consistency within or across data from one observed agent: these plausibility checks are conditions referring to a single attribute or a relationship between two attributes that refer to the same observed agent for the same date. Examples include the condition that the carrying amount should not normally be negative, and that the outstanding nominal amount should not be less than the carrying amount.
- Consistency across time: these are conditions referring to a relationship between two values, both derived from AnaCredit from one observed agent across multiple dates. An example is the condition that the total outstanding nominal amounts of an observed agent should be relatively stable across consecutive reference dates. Any such changes are unlikely to be due to the financial activities of the bank.
- Consistency with data from other observed agents: these are conditions referring to a relationship between two values, both derived from AnaCredit from multiple observed agents for a single date. For instance, one might compare information from multiple observed agents for syndicated loan instruments with the same syndicated contract identifier; attributes such as the debtor and the inception date should be the same across all observed agents who hold the same syndicated loan. Any differences between them are considered to be the result of a data quality issue.
- Changes in an observed agent's rank compared to other observed agents: these are conditions referring to a relationship between two values, both derived from AnaCredit from multiple observed agents for multiple dates. For instance, one might analyse the ranking of an observed agent using the sum of the outstanding nominal amount and identify possible errors in reporting when significant changes take place. As with all plausibility checks, large changes are possible but unlikely.

2.2.2 External plausibility checks

External plausibility checks assess the consistency of data reported under AnaCredit with other datasets. In particular, they compare and reconcile the data available for an

observed agent (or group of agents) under AnaCredit with data made available for the same agent(s) under other statistical or supervisory reporting frameworks.

To assess whether a condition to which a specific plausibility check refers holds, it is necessary to compare and reconcile the two datasets involved. Comparison and reconciliation of AnaCredit data with external data is only possible if definitions, concepts, scopes and accounting practices are sufficiently similar. More precisely, reconciling data comprises the following stages:

- the plausibility check is defined in the form of one of more algorithms to be applied to both the external dataset and the AnaCredit data;
- the benchmark value is taken to be the output of the algorithm applied to the external dataset;
- the AnaCredit equivalent value is taken to be the output of the algorithm applied to the AnaCredit dataset;
- a data quality index (DQI) evaluates whether and to what degree the condition holds by quantifying the deviation between the benchmark value and the AnaCredit equivalent value. The value of the DQI is employed to evaluate the likelihood that the data may be erroneous.

External plausibility checks can be classified based on whether the check includes data related to a single reference date (the structure category in **Figure 1**) or multiple dates (the stability category in **Figure 1**). Accordingly, two classes can be defined:

- Checks for consistency with statistical and supervisory reporting for a single reference date: these refer to a relationship between the AnaCredit value (derived solely from AnaCredit data) reported for a particular reference date and the benchmark value (derived from the external statistical or supervisory dataset). An example is the comparison and reconciliation of AnaCredit data and BSI data for a given reference date.
- Checks for consistency with statistical and supervisory reporting for multiple reference dates: these refer to relationships between AnaCredit values and benchmark values from the external dataset over time, i.e. for multiple reference dates. An example is the comparison and reconciliation of the change of loans reported in AnaCredit with the corresponding change in the BSI data.

External plausibility checks typically focus on data from individual observed agents. This makes it possible to identify implausible data and the necessary remedial action efficiently. However, some plausibility checks also consider benchmarks which relate to a group of agents rather than just one.

3 AnaCredit external plausibility checks

The following subsections contain the details of the AnaCredit external plausibility checks. For general descriptions and guidance on external plausibility checks, please refer to Section 2.

3.1 List of external plausibility checks performed under AnaCredit

Table 1 shows the external plausibility checks under AnaCredit.

Table 1
Comparisons with external benchmarks carried out as part of the AnaCredit plausibility checks

Plausibility check identifier	Definition	Description
C_IBSI.A20.A.1.U2.ALL.Z01.E	Comparing the individual MFI BSI position {loans to euro area NFCs, MFIs, OFIs and non-MMF investment funds, ICPFs, Gov} with its AnaCredit equivalent	The check compares the individual MFI BSI statistic "total loans to euro area residents, excluding households and non-profit institutions serving households" with its AnaCredit equivalent at the level of an individual observed agent. See Section 3.2.1.1 for a description of the benchmark "total loans to euro area residents, excluding households and non-profit institutions serving households"

For a quarter-end, the check is performed at the level of an individual observed agent (or group of agents) if:

- the individual BSI position or the AnaCredit data are available for the agent;
- the submission deadline referred to in Article 13(1)(5) of the AnaCredit Regulation for the reference date has passed;
- the agent is not partially or fully derogated from AnaCredit reporting for that date.

3.2 Plausibility checks with other statistical reporting frameworks

This section includes AnaCredit external plausibility checks against other statistical reporting frameworks.

3.2.1 Plausibility checks with individual BSI statistics

This section describes the calculation of the AnaCredit external plausibility checks that compare AnaCredit data with the balance sheet items (BSI) statistics of individual monetary financial institutions (MFIs) collected under the BSI Regulation.

The statistics on MFI balance sheets provide the basis for the regular analysis of euro area monetary aggregates and counterparties. MFIs are defined as central banks and other MFIs, which comprise credit institutions, deposit-taking corporations other than credit institutions, and money market funds. Both domestic positions and those with residents of other euro area countries as counterparties are covered. The underlying concepts are those set out in the European System of Accounts.[4]

The two main concepts AnaCredit and BSI data have in common are credit institutions and loans, and they are well harmonised in this respect, not least thanks to the use of common definitions and concepts. Granular AnaCredit and aggregate BSI data relating to loans to legal entities held by credit institutions should therefore be consistent with each other, as the methodologies are reasonably comparable.

The reporting population for the BSI Regulation consists of MFIs and non-MFI credit institutions resident in euro area member countries. Resident credit institutions include resident branches that have their head office abroad but exclude foreign branches of resident institutions.[5] The Regulation distinguishes between MFIs and non-MFI credit institutions subject to full reporting requirements, and "small" institutions to which derogations are applicable. The panel of institutions for which the individual BSI statistics are available covers almost the entire population of euro area credit institutions.

MFIs and non-MFI credit institutions report the end-month amounts specified in Table 1 in Part 2 of Annex I of the BSI Regulation to the relevant NCB in line with the frequency and timeliness determined by their NCB.[6] The NCBs transmit the monthly country aggregates to the ECB by close of business on the 15th working day after the end of the month to which they relate. Statistical information on individual balance sheet items at the level of a single credit institution is reported by NCBs to the ECB in accordance with Guideline ECB/2021/11.[7]

The definition of the benchmark value derived from BSI data is provided in Section 3.2.1.1.

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4 Eurostat, *European System of Accounts (ESA 2010)*, Publications Office of the European Union, Luxembourg, 2013.

5 Article 4(1)(17) of the Capital Requirements Regulation (Regulation (EU) No 575/2013) states that "branch" means a place of business which forms a legally dependent part of an institution and which carries out directly all or some of the transactions inherent in the business of institutions.

6 End-of-month balance sheet data in principle refer to the last calendar day of a month.

7 Guideline (EU) 2021/830 of the European Central Bank of 26 March 2021 on balance sheet item statistics and interest rate statistics of monetary financial institution (ECB/2021/11) (OJ L 208, 11/06/2021, p. 1). For more information about the BSI statistical reporting requirements, refer to the Manual on MFI balance sheet statistics, which supplements the information contained in the ECB legal act. This contains various additional explanations and recommendations to help with the implementation of the requirements and further improve the understanding of the MFI balance sheet statistics.

Obtaining the AnaCredit equivalent value to the BSI benchmark value requires the outstanding balances of instruments reported to AnaCredit to be suitably transformed and aggregated so they all correspond methodologically to the BSI benchmark value. The algorithm employed to this end is provided in Section 3.2.1.2.

3.2.1.1 BSI benchmark value

The main purpose of comparing BSI data with AnaCredit data is to ensure that the loan portfolios which are required to be reported to AnaCredit are actually reported. To this end, the BSI value of total loans to euro area residents, excluding households and non-profit institutions serving households is chosen as a benchmark value and defined as specified below.

The benchmark value associated with check C_IBSI.A20.A.1.U2.ALL.Z01.E refers to loan stocks as reflected in the outstanding nominal amounts of loans and covers total loans to euro area residents, excluding households and non-profit institutions serving households.

In terms of balance sheet items, this is the sum of the following positions in Table 1 (under Assets) in Annex I to the BSI Regulation, taking both domestic residents (Section A) and euro area other than domestic residents (Section B):

- loans to non-financial corporations (S.11) across all the maturity breakdowns;
- loans to general government (S.13) across all maturity breakdowns;
- loans to MFIs: central banks (S.121), deposit taking corporations except central banks (S.122) and money market funds (MMFs) (S.123);
- loans to non-MMF investment funds (S.124) across all maturity breakdowns;
- loans to other financial intermediaries, financial auxiliaries, captive financial institutions and money lenders (S.125+S.126+S.127) across all maturity breakdowns;
- loans to insurance corporations (S.128) across all maturity breakdowns;
- loans to pension funds (S.129) across all maturity breakdown.

3.2.1.2 AnaCredit equivalent value

This section provides a description of the algorithm employed to calculate the AnaCredit equivalent value to the BSI benchmark value for total loans to euro area residents, excluding households and non-profit institutions serving households.

The algorithm is carried out at the level of a given observed agent and for a given reporting date. The calculation takes a number of AnaCredit attributes as input (these are listed in the section below headed “Relevant AnaCredit attributes”) and is carried out in several steps, so cases of missing or incorrect input data are suitably dealt with (as explained in the section below headed “

Treatment of incorrect or inconsistent data"). The following sections set out the detailed calculation rules for deriving the AnaCredit equivalent value.

As the BSI position considered is total loans to euro area residents, excluding households and non-profit institutions serving households, this implies that only loans extended to debtors resident in the euro area and classified under non-financial corporations (S.11), financial corporations (S.12) or general government (S.13) should be considered.[8]

However, while the reporting agents generally follow harmonised accounting rules in their BSI reporting, compilation practices can differ across countries.[9] It may therefore be necessary to specify additional country-specific conditions to reduce or eliminate bias. These adjustments are explained in more detail in the section headed "Auxiliary calculations".

The [relevant BSI balance] calculated is summed across all pairs of instruments and debtors available under AnaCredit for the observed agent in the counterparty-instrument dataset for a given reporting date, provided they meet the conditions specified in the WHERE clause, and reflects the selection of relevant AnaCredit instruments (loans), so the resulting aggregate is a good match to the BSI statistic.[10] The WHERE clause reflects the identification of instruments of a given observed agent included in the aggregate – these are generally referred to as "instruments identified as relevant to the BSI benchmark".

The calculation rule for the AnaCredit equivalent value to the BSI benchmark value is summarised in a pseudo-query as follows. The query selects all instruments relevant to the BSI benchmark and adds up the [relevant BSI balance] at the level of an individual bank.

```
SUM (([relevant BSI balance])
WHERE
        [balance sheet item] = 1
AND ( [country of debtor] in {"Euro area countries"}
AND ( [institutional sector of debtor] in ("S11", "S12", "S13"))
AND ( [relevant BSI balance] is not NULL)
BY   [reference date], [observed agent ID]
```

The calculation is depicted in the following flowchart and discussed in more detail in the section below, which deals specifically with the auxiliary calculations.

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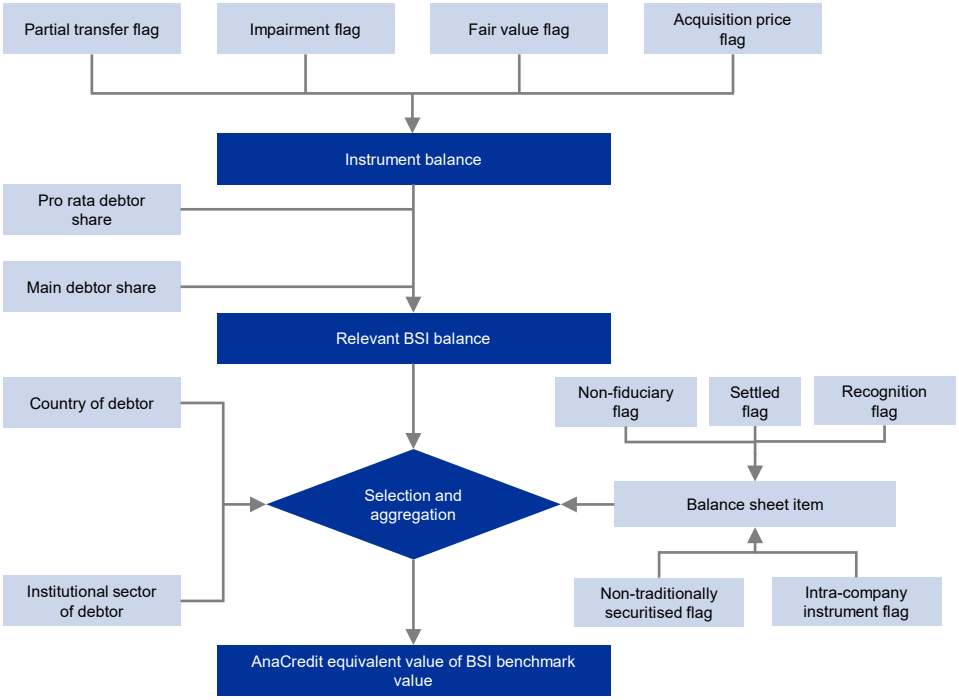
8 See ESA 2010 for the definition of institutional sectors and subsectors. Note that institutional sector and location are separate properties of a debtor. For example, a loan granted to a non-financial corporation in Germany is classified under non-financial corporations (S.11) and the country of the debtor is DE.

9 For BSI statistics, deposits and loans are reported at the principal amount outstanding, excluding amounts written off or written down, as in ESA 2010. Loans should be reported gross of provisions, but a few NCBs allow loans to be reported net of provisions and purchased loans at the price agreed at the time of acquisition, in line with long-standing practice. This is permitted by the Regulation provided such practices are applied by all resident reporting MFIs. See Survey of national practices regarding MFI balance sheet statistics, ECB, Frankfurt am Main. November 2015.

10 The level of granularity for the counterparty-instrument data is the counterparty-instrument combination. Each record is uniquely identified by its combination of the following data attributes: (a) reporting agent identifier; (b) observed agent identifier; (c) counterparty identifier; (d) contract identifier; (e) instrument identifier; (f) counterparty role. When calculating the AnaCredit equivalent, only those records in the counterparty-instrument dataset relating to the observed agent and the reference date for which the counterparty role is "debtor" are considered.

Figure 2

Calculation of AnaCredit equivalent to the BSI benchmark – flowchart



Source: ECB

To calculate the AnaCredit equivalent value, all occurrences of an instrument in the counterparty-instrument dataset where the [counterparty role] is equal to "Debtor" (i.e. all unique combinations of instrument and debtor) are considered.[11]

In the first step, all such instances are assigned the [instrument balance], i.e. the instrument's outstanding balance adjusted for a number of factors to reconcile AnaCredit with BSI, including certain national features (see footnote 9 above). These include the [loan loss provision adjustment], [fair value adjustment] and [acquisition price adjustment]. The [instrument balance] is the same for all occurrences of the instrument across all debtors.

The [instrument balance] is then adjusted where relevant to account for the number of debtors; this essentially reflects the [debtor share] in the instrument. The resulting balance is referred to as the [relevant BSI balance] and may vary across the debtors related to the instrument. It also depends on whether loans are allocated to the main debtors [main debtor share] or to all debtors on a pro-rata basis [pro rata debtor share] at national level.

The [relevant BSI balance] thus calculated is then grossed up across instruments relevant to the BSI benchmark. Instruments are only considered if they are [balance sheet items] – specifically, BSI statistics include instruments which are non-fiduciary, settled, non-traditionally securitised and are either recognised or intra-company loans.

[11] This implies that a single instrument is considered as many times as there are debtors associated with the instrument.

The country and institutional sector of the debtor are also considered when carving out the relevant instruments.

As missing or inconsistent input data affect the calculations, all rules also cover cases where they cannot be completed (i.e. they lead to *NULL* values).

The AnaCredit equivalent value is calculated for every observed agent for which the benchmark value of total loans to euro area residents, excluding households and non-profit institutions serving households is available under the BSI Regulation and for which data are expected in AnaCredit, allowing for any derogations.

Since the calculation requires AnaCredit accounting data which are only reported on a quarterly basis, this external plausibility check is only executed for reference dates which are quarter-ends.

Once the AnaCredit equivalent value has been calculated it is evaluated against the benchmark value, giving rise to a data quality index (DQI) as explained below in Section 3.2.1.3.

Relevant AnaCredit attributes

The AnaCredit equivalent value is obtained solely from attributes required by the AnaCredit Regulation, which serve as input to the calculation. Besides the relevant internal identifiers which define the relationships in the data, the attributes used are the following:

Table 2

Attributes relevant for calculating the AnaCredit equivalent value

Instrument-level data (from the instrument, financial and accounting datasets)	Counterparty-instrument-level data (from the counterparty-instrument and joint liabilities datasets)	Counterparty level data (from the counterparty reference and counterparty risk and default datasets)
Outstanding nominal amount	Counterparty role	Institutional sector
Transferred amount	Joint liability amount	Address: country
Accumulated changes in fair value due to credit risk		
Accumulated impairment amount		
Impairment assessment method		
Fiduciary instrument		
Balance sheet recognition		
Type of securitisation		
Settlement date		

Treatment of incorrect or inconsistent data

Whenever the information required for the calculation of an AnaCredit statistic is missing or inconsistent, amounts associated with the instruments concerned are not included in the relevant calculation. In particular, the AnaCredit equivalent value to the

BSI benchmark value of total loans to euro area residents, excluding households and non-profit institutions serving households cannot consider amounts of instruments where any of the attributes indicated in the section above entitled “Relevant AnaCredit attributes” is missing or inconsistent.

A minimum level of consistency within the information reported to AnaCredit is also necessary to ensure the result of the calculation is sound. Whenever any of the following conditions apply, the calculation of the AnaCredit equivalent value therefore disregards the records concerned:

- the transferred amount exceeds the outstanding nominal amount;
- the joint liability amount of a debtor exceeds the outstanding nominal amount;
- the observed agent is the debtor;
- the settlement date is later than the reference date.

Auxiliary calculations

This section provides the detailed rules for calculating the [relevant BSI balance] for individual instruments in AnaCredit. These balances are then aggregated to obtain the AnaCredit equivalent value for an individual observed agent.

Please note that the calculation rules described in this section apply to the data specifications as described in the AnaCredit Regulation. The specific implementation and data structure schemes applied by the relevant NCBs may therefore require some adaptation.

Relevant BSI balance

The [relevant BSI balance] is the debtor’s balance owed to the MFI aggregated across relevant instruments.

The [relevant BSI balance] is calculated as the part of [instrument balance] proportional to the debtor’s share (either the pro rata or main debtor share, depending on the observed agent’s country, in line with the guidance given for BSI):

- if the country of the observed agent is any of the following countries {AT, EE, FR, GR, IE, LT, LU, MT, NL, PT, SI, SK}, the calculated [instrument balance] is allocated proportionally to all debtors based on the joint liability amount (i.e. proportionally to [pro rata debtor share]);
- if the country of the observed agent is any of the following countries {BE, CY, ES, FI, DE, IT, LV}, the calculated [instrument balance] is entirely allocated to the main debtor(s) (i.e. proportionally to [main debtor share]).

If any of the input data necessary for this calculation are missing or inconsistent, the [relevant BSI balance] resolves to *NULL* for the instrument concerned. In particular, if the debtor is equal to the observed agent, the [relevant BSI balance] is not computed for this instrument-debtor combination.

IF ([country of observed agent] is
(AT, EE, FR, GR, IE, LT, LU, MT, NL, PT, SI, SK)
AND ([pro rata debtor share] is *NULL* **OR** [instrument balance] is *NULL*))
OR
([country of observed agent] is (BE, CY, ES, FI, DE, IT, LV)
AND ([main debtor share] is *NULL* **OR** [instrument balance] is *NULL*))
OR
([observed agent identifier] = [debtor identifier])
THEN [relevant BSI balance] = *NULL*
ELSE DO:
IF [country of observed agent] is (AT, EE, FR, GR, IE, LT, LU, MT, NL, PT, SI, SK)
THEN [relevant BSI balance] = [pro rata debtor share] * [instrument balance]
ELSE [relevant BSI balance] = [main debtor share] * [instrument balance]
END
BY [reference date], [observed agent ID], [contract ID], [instrument ID], [debtor identifier]

Instrument balance

The [instrument balance] takes the instrument's outstanding nominal amount as a starting point.

In line with the BSI statistical requirements, the outstanding nominal amount is suitably reduced by i) the transferred amount for partially transferred instruments; ii) the accumulated impairment amount for countries where BSI statistics are reported net of loss provisions; iii) the accumulated changes in fair values due to credit risk for countries where instruments are reported at fair value in BSI statistics; iv) fair value changes due to changes in credit risk before purchase for countries where new instruments are reported at fair value in BSI statistics.

If the resulting instrument balance is negative it is set to zero, so negative amounts do not contribute to the calculation of the AnaCredit equivalent value.

If the necessary input data are missing or inconsistent, the [instrument balance] resolves to *NULL* for the instrument concerned and the instrument is disregarded when calculating the AnaCredit equivalent value.

```
IF [outstanding nominal amount] is NULL
   OR [transferred amount] is NULL
    OR [partial transfer flag] is NULL
   OR [impairment flag] is NULL
   OR [fair value flag] is NULL
   OR [acquisition price flag] is NULL
THEN [instrument balance] = NULL
ELSE DO:
        [instrument balance] = MAX(0,
          [outstanding nominal amount]
        – [partial transfer flag] * [transferred amount]
        – [impairment flag] * [accumulated impairment amount]
        – [fair value flag] * [accumulated changes in fair value due to credit risk]
        – [acquisition price flag] * [fair value changes due to changes in credit risk
        before purchase]
        )
END
```

Balance sheet item

BSI statistics only include instruments which are non-fiduciary, non-intra-company, settled, non-traditionally securitised and are either recognised or intra-company loans. [12] To reflect this, instruments in AnaCredit are considered a balance sheet item if each of the conditions specified in the previous sentence are met. Otherwise, they are not considered such and are disregarded when calculating the AnaCredit equivalent value. Consequently, [balance sheet item] is calculated as follows.

```
IF      [non-fiduciary flag] is NULL
  OR   [settled flag] is NULL
  OR   [non-traditionally securitised flag] is NULL
  OR    [recognition flag] is NULL
THEN [balance sheet item] = NULL
ELSE DO:
   IF       [non-fiduciary flag] = 1
     AND [settled flag] = 1
     AND [non-traditionally securitised flag] = 1
     AND ([recognition flag] = 1 OR [intra-company instrument flag] =1)
   THEN [balance sheet item] = 1
   ELSE [balance sheet item] = 0
```

The auxiliary flags used to calculate the balance sheet items are defined below. If any of the auxiliary flags cannot be determined due to missing input, i.e. are “NULL”, the item cannot be calculated and the underlying instrument is disregarded when calculating the AnaCredit equivalent value.

Non-fiduciary flag

BSI statistics do not include fiduciary loans, i.e. loans made by a credit institution acting as trustee or fiduciary on behalf of a third party (the trustor/beneficiary), with the latter assuming the credit risk and the MFI being responsible for managing the loan.

[12] Non-traditionally securitised instruments are only relevant in Ireland.

Such loans are not included in BSI statistics, even where they are recognised in the balance sheet of the credit institution that acts as the intermediary in the loan. The [non-fiduciary flag] is set on the basis of the [fiduciary instrument] attribute and calculated as follows.

If the [fiduciary instrument] attribute is not reported (i.e. when it is neither "fiduciary instrument" nor "non-fiduciary instrument"), the [non-fiduciary flag] cannot be calculated due to lack of input data and the given instrument is disregarded when calculating the AnaCredit equivalent value.[13]

IF [fiduciary instrument] **is not in** ("fiduciary instrument", "non-fiduciary instrument")
THEN [non-fiduciary flag] = *NULL*
ELSE DO:
    IF [fiduciary instrument] = "non-fiduciary instrument"
    THEN [non-fiduciary flag] = 1
    ELSE [non-fiduciary flag] = 0
END

Balance sheet recognition flag

BSI statistics include loans which are recognised by the observed agent according to the accounting standard applied. The balance sheet recognition flag, abbreviated as [recognition flag], is calculated based on the recognition of the instrument. An instrument is considered under BSI if it is either "entirely recognised" or "recognised to the extent of the institution's continuing involvement". The [recognition flag] is calculated as follows.

If the [balance sheet recognition] attribute is not reported (i.e. is not equal to any of the following values: "entirely recognised", "recognised to the extent of the institution's continuing involvement" or "entirely derecognised"), it cannot be calculated due to the lack of input data and the given instrument is disregarded when calculating the AnaCredit equivalent value.[14]

IF [balance sheet recognition] is not in ("entirely recognised", "recognised to the extent of the institution's continuing involvement", "entirely derecognised")
THEN [recognition flag] = *NULL*
ELSE DO:
    IF [balance sheet recognition] is ("entirely recognised", "recognised to the extent of the institution's continuing involvement")
    THEN [recognition flag] = 1
    ELSE [recognition flag] = 0
END

Intra-company instrument flag

BSI statistics also include intra-company loans, i.e. loans where the creditor and the debtor belong to the same legal entity. The [intra-company instrument flag] is calculated as follows. The attribute [head office undertaking identifier] required for the observed agent is compared with [head office undertaking identifier] of the debtor. If

[13] See validation check CT0040 in AnaCredit validation checks.

[14] See validation check CT0380 in AnaCredit validation checks.

the debtor and the observed agent are the same legal entity, the instrument is an intra-company loan.

IF ([debtor identifier] is *NULL*
THEN [intra-company instrument flag] = *NULL*
ELSE DO:
    IF legal entity of [observed agent] = legal entity of [debtor]
    THEN [intra-company instrument flag] = 1
    ELSE [intra-company instrument flag] = 0
END

Non-traditionally securitised loans

In Ireland, traditionally securitised loans which are still recognised are excluded from BSI statistics under Article 9(4) of the BSI Regulation. Consequently, if the country of the observed agent is Ireland, loans subject to traditional securitisation which are still recognised are disregarded (i.e. their exposure is set to zero). Otherwise, no adjustment for securitised loans is made. The adjustment for the securitised loans flag, abbreviated as [securitised loans adj. flag], is calculated as follows.

If the attribute [type of securitisation] is not reported for observed agents located in Ireland (i.e. a value not in the domain of the attribute or no value is reported when the concept applies), the [non-traditionally securitised loan flag] cannot be calculated due to the lack of input data and the given instrument is disregarded when calculating the AnaCredit equivalent value.[15]

IF [country of the observed agent] = (IE) and [type of securitisation] is not in ("traditional securitisation", "synthetic securitisation", "not securitised")
THEN [non-traditionally securitised flag] = *NULL*
ELSE DO:
    IF [country of observed agent] is (IE)
        AND [type of securitisation] = "traditional securitisation"
    THEN [non-traditionally securitised flag] = 0
    ELSE [non-traditionally securitised flag] = 1
END

Settled loans

BSI statistics only include loans which have been settled, i.e. loans on which some or all of the funds have been disbursed. On the other hand, AnaCredit may include instruments at the time when the contract is signed. In addition, AnaCredit includes instruments with a positive outstanding nominal amount reflecting fees that the debtor owes to the creditor, even when the loan funds have not yet been disbursed. Settled loans are identified in AnaCredit as instruments for which a valid settlement date is reported. The [settled adj. flag] is calculated as follows.

If the attribute [settlement date] is not reported (i.e. when a value not in the domain of the attribute or no value is reported when the concept applies), the [settled flag] cannot

[15] When the concept referred to in a given attribute does not apply, this attribute is reported as "non-applicable" (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

be calculated (i.e. it is “NULL”) and the given instrument is disregarded when calculating the AnaCredit equivalent value.[16]

IF [settlement date] is *NULL* AND [settlement date] ≠ “Non-applicable”
THEN [settled flag] = *NULL*
ELSE DO:
    IF [settlement date] ≤ [reference date] AND [settlement date] ≠ “Non-applicable”
    THEN [settled flag] = 1
    ELSE [settled flag] = 0
END

Partially transferred instruments

Under AnaCredit, in the case of partially transferred instruments which are not split, the attribute “balance sheet recognition” corresponds to the retained part of the instrument.[17] Consequently, this attribute may not be sufficient to accurately determine the observed agent’s on-balance-sheet amount in such cases.[18]

When calculating the AnaCredit equivalent value the following convention is applied to partially transferred instruments, bearing in mind that in some countries transfer of a loan results in its derecognition:[19]

- for partially transferred loans, the amount transferred is deducted in full from the outstanding nominal amount, so only the outstanding nominal amount retained is considered;
- in certain countries where the transferred amount of a partially transferred loan is recognised, the full outstanding nominal amount of the loan is considered, i.e. there is no adjustment for partially transferred loans. This is the case in Spain.

The partial transfer adjustment is calculated as follows.

If the necessary input data are missing or inconsistent, the [partial transfer flag] resolves to *NULL* for the instrument concerned.[20] Specifically, if either of the attributes [outstanding nominal amount] and [transferred amount] are not reported (i.e. a value not in the domain of the attribute is reported or no value is reported at all) or the

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16 When the concept referred to in a given attribute does not apply, this attribute is reported as “non-applicable” (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

17 Splitting partially transferred instruments when reporting to AnaCredit is optional – see Section 4.4.3 of Part II of the AnaCredit reporting manual, ECB, Frankfurt am Main, May 2019.

18 In the case of a partial transfer where both the observed agent and at least one other entity are creditors of the instrument, the transferred part of the instrument and the retained part of the instrument may have different balance sheet recognition statuses. If the instrument is not split, the AnaCredit data model only allows one such status. The status reported for partially transferred instruments corresponds to the retained part of the instrument. The attribute “balance sheet recognition” is therefore not on its own sufficient to actually determine the on-balance sheet amounts of the observed agent.

19 This convention implies that the BSI statistic may be larger than its AnaCredit equivalent by the amount the observed agent transfers and still recognises in the balance sheet. However, given that in AnaCredit the outstanding nominal amount of fully transferred loans not recognised is almost twice the amount recognised, the resultant imprecision is considered to only have minor impact and can be addressed by setting suitable tolerance levels. It therefore does not hamper the plausibility check aimed at ensuring consistency between AnaCredit and the BSI data.

20 See validation checks CT0280 and CT0320 in AnaCredit validation checks.

attributes are inconsistent (i.e. [outstanding nominal amount] < [transferred amount]), the [partial transfer flag] cannot be calculated and the given instrument is disregarded when calculating the AnaCredit equivalent value.

```
IF [outstanding nominal amount] is NULL
   OR [transferred amount] is NULL
   OR [outstanding nominal amount] < [transferred amount]
THEN [partial transfer flag] = NULL
ELSE DO:
        IF [country of observed agent] is (ES) THEN DO:
            [partial transfer flag] = 0
        END
        ELSE DO:
            IF 0 < [transferred amount] < [outstanding nominal amount]
            THEN [partial transfer flag] = 1
            ELSE [partial transfer flag] = 0
        END
END
```

Loan loss provisions adjustment

Under BSI statistics, a few NCBs allow loans to be reported net of provisions, and thus an adjustment is needed when calculating the [instrument balance]. This applies to observed agents resident in Germany and Finland.

In such cases, the [instrument balance] is adjusted by the amount reported to AnaCredit under the data attribute [accumulated impairment amount]. The impairment adjustment flag, abbreviated as [impairment flag], is calculated as follows.

If the necessary input data, which include [accumulated impairment amount] and [impairment assessment method], are missing or inconsistent, the [impairment flag] resolves to *NULL* for the instrument concerned.[21] More specifically, if in the case of observed agents located in Finland the attribute [accumulated impairment amount], or in the case of observed agents located in Germany the attributes [accumulated impairment amount] or [impairment assessment method], is/are not reported (i.e. a value not in the domain of the attribute is reported or no value is reported when the concept applies), the [impairment flag] cannot be calculated.[22]

[21] See validation check CT0400 in AnaCredit Validation Checks. When the concept referred to in a given attribute does not apply, this attribute is reported as "non-applicable" (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

[22] When the concept referred to in a given attribute does not apply, this attribute is reported as "non-applicable" (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

IF [country of observed agent] is (FI) **AND** [accumulated impairment amount] is *NULL*
OR [country of observed agent] is (DE) **AND** ([accumulated impairment amount] is *NULL* **OR** [impairment assessment method] is *NULL*)
THEN [impairment flag] = *NULL*
ELSE DO:

IF [country of observed agent] is (FI) **THEN** [impairment flag] = 1;
IF [country of observed agent] is (DE)
AND [impairment assessment method] = ”individually assessed”
THEN [impairment flag] = 1;
ELSE [impairment flag] = 0;
END

Fair value adjustment

Similar to the loan loss provision adjustment, an adjustment is applied to allow for the fact that some instruments may be measured at fair value in BSI statistics. If the observed agent is resident in Germany or Finland, all instruments are adjusted to reflect the amounts reported under the data attribute [accumulated changes in fair value due to credit risk]. Instances that are relevant for the adjustment are identified by the fair value adjustment flag, abbreviated as [fair value flag] which is set as follows.

If the necessary input data are missing or inconsistent, the [fair value flag] resolves to *NULL* for the instrument concerned. In particular, if the attribute [accumulated changes in fair value due to credit risk] is not reported (i.e. a value not in the domain of the attribute is reported or no value is reported when the concept applies), or if a negative value is reported under this attribute, the [fair value flag] cannot be calculated.[23]

IF [country of observed agent] is (DE, FI) **AND**
([accumulated changes in fair value due to credit risk] is *NULL* **OR** [accumulated changes in fair value due to credit risk] < 0)
THEN [fair value flag] = *NULL*
ELSE DO:
IF [country of observed agent] is (DE, FI) **AND** ([accumulated changes in fair value due to credit risk] ≥ 0)
THEN [fair value flag] = 1;
ELSE [fair value flag] = 0
END

Acquisition price adjustment

Under BSI statistics, a few NCBs allow purchased loans to be reported at the price agreed at the time of their acquisition; where this happens, a country-specific adjustment is made to the calculation of the [instrument balance].

The adjustment is applicable to observed agents resident in Belgium, Germany, Italy, Austria and Slovenia; if they are located in any of these countries, the outstanding

[23] See the AnaCredit Q&A relating to negative amounts of the attribute “accumulated changes in fair value due to credit risk”. When the concept referred to in a given attribute does not apply, this attribute is reported as “non-applicable” (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

amount of the instrument is corrected by the amount of [fair value changes due to changes in credit risk before purchase] reported under AnaCredit, to reflect the fact that impaired loans acquired at a discount are recorded at the acquisition price for BSI purposes.

The acquisition price adjustment flag, abbreviated as [acquisition price flag], is calculated as follows. If the necessary input is missing, the [acquisition price flag] resolves to *NULL* for the instrument concerned. In particular, if the attribute [fair value changes due to changes in credit risk before purchase] is not reported (i.e. when a value not in the domain of the attribute is reported or no value is reported when the concept applies) for observed agents located in Belgium, Germany, Italy, Austria or Slovenia, the [acquisition price flag] cannot be calculated and the given instrument is disregarded when calculating the AnaCredit equivalent value.[24]

IF [country of observed agent] is (AT, BE, DE, IT, SI)
AND [fair value changes due to changes in credit risk before purchase] is *NULL*
THEN [acquisition price flag] = *NULL*
ELSE DO:
    IF [country of observed agent] is (AT, BE, DE, IT, SI)
    AND [fair value changes due to changes in credit risk before purchase] > 0 **THEN** [acquisition price flag] = 1;
    ELSE [acquisition price flag] = 0
END

Country of debtor

The country of the debtor is required to carve out the debtor-instrument pair in the counterparty-instrument dataset for which the debtor is a domestic (in the country of the observed agent) or other euro area resident.

The country of the debtor is established solely on the basis of the AnaCredit data attribute [address: country] reported for the counterparty concerned.

If where the AnaCredit data attribute [address: country] is missing for the counterparty acting as the debtor, or if the debtor is not reported under AnaCredit, the [country of the debtor] resolves to *NULL* for the instrument concerned and the [relevant BSI balance] relating to the debtor is disregarded when calculating the AnaCredit equivalent value.[25]

The country of the debtor is calculated for all debtors in the instrument.

[24] When the concept referred to in a given attribute does not apply, this attribute is reported as "non-applicable" (see Section 2.2 in Part II of the AnaCredit reporting manual). In such cases, the attribute is considered to have been reported.

[25] Under Article 9.2 of the AnaCredit Regulation, NCBs may obtain any information related to the identification of counterparties through direct reporting by the reporting agents or arrangements with national statistical institutes, national competent authorities and other national authorities.

IF [address: country] is *NULL* **THEN** [country of the debtor] = *NULL* **ELSE** [country of the debtor] = [address: country]

Institutional sector of debtor

The institutional sector of the debtor is needed to carve out the debtor-instrument pairs in the counterparty-instrument dataset for which the debtor belongs to any of the following sectors: non-financial corporations (S.11), financial corporations (S.12) or general government (S.13).[26]

The institutional sector of the debtor is established solely on the basis of the AnaCredit data attribute [institutional sector] reported in the counterparty reference data for the counterparty concerned.

If the AnaCredit attribute [institutional sector] is missing for the counterparty acting as the debtor, or if the debtor is not identified under AnaCredit, the [institutional sector of the debtor] resolves to *NULL* for the instrument concerned and the [BSI aggregable balance] relating to the debtor is disregarded when calculating the AnaCredit equivalent value (as it cannot be determined whether the debtor belongs to the corresponding institutional sector).

The institutional sector of the debtor is calculated for all debtors in the instrument.

IF [institutional sector] is NULL **THEN** [institutional sector of the debtor] = NULL
ELSE DO:
    IF [counterparty role] = debtor **THEN** [institutional sector of the debtor] = [institutional sector]
END

Debtor share

When calculating the AnaCredit equivalent value, all occurrences of an instrument in the counterparty-instrument dataset are considered where the [counterparty role] = “debtor” (i.e. all unique combinations of instrument and debtor). All such instances are assigned the same [instrument balance] across all debtors related to the instrument, which is computed on the basis of the instrument’s outstanding nominal amount. This is then suitably adjusted to arrive at the [relevant BSI balance], which corresponds to the share of each individual debtor in the instrument. The share is computed in the way which best represents the practices followed under BSI statistics.

The debtor share is relevant to instruments with several debtors.

[26] Contrary to the convention applied in the European System of Accounts (ESA 2010) (see the definition of the institutional sectors and their subsectors therein), under AnaCredit the institutional sector and the location of the debtor are separate data attributes. This means that in the case of a debtor that is a non-financial corporation located in Germany, for example, under AnaCredit the institutional sector of the debtor is S.11 and the country of the debtor is Germany, irrespective of the location of the observed agent concerned.

Number of debtors

For any given instrument, the [number of debtors] related to it is calculated based on the information in the counterparty-instrument dataset in unique groups, by reference date, observed agent, contract and instrument.

[number of debtors] = **COUNTIF(**[counterparty identifier]), **WHERE** [counterparty role] = “debtor”**)**
BY [reference date], [observed agent ID], [contract ID], [instrument ID]

Pro rata debtor share

For any given instrument, [pro rata debtor share] is calculated for each debtor related to it based on the information in the counterparty-instrument dataset. It reflects the debtor’s joint liability amount divided by the total joint liability amount of all debtors related to the instrument as reported in the joint liabilities dataset.

If only one debtor is reported, calculation of the [pro rata debtor share] of that debtor depends on whether or not the [joint liability amount] is reported, in order to account for the rare cases where the remaining debtors are natural persons. If reported, the [pro rata debtor share] is given by the [joint liability amount] divided by the [outstanding nominal amount]; if not, the [pro rata debtor share] equals 1.

If all the debtors fall in the scope of AnaCredit (i.e. they are not natural persons), the [pro rata debtor share] is the debtor’s [joint liability amount] divided by the sum of the [joint liability amount] of all debtors related to the instrument, unless their combined [joint liability amount] is zero. If the combined [joint liability amount] is zero, the [pro rata debtor share] is 1 divided by the number of debtors.

The calculation is detailed in the following formula. The resulting [pro rata debtor share] is calculated separately for each debtor of the instrument. If the required input data are missing or inconsistent, the [pro rata debtor share] resolves to *NULL* for the debtors concerned.

```
IF [joint liability amount] > [outstanding nominal amount]
OR ([number of debtors] > 1) AND ANY([joint liability amount])=NULL)
THEN [pro rata Debtor share] = NULL
ELSE DO:
    IF [number of debtors] = 1 THEN DO:
            IF [joint liability amount] = NULL THEN [pro rata debtor share] = 1
            ELSE IF [joint liability amount] = 0 AND [outstanding nominal amount]=0
            THEN [pro rata debtor share] = 1/2[27]
            ELSE [pro rata debtor share] = [joint liability amount] / [outstanding
            nominal amount])
    END:
    ELSE IF [number of debtors] > 1 THEN DO:
            IF SUM([joint liability amount]) = 0 AND [outstanding nominal amount] = 0
            THEN [pro rata debtor share] = 1/[number of debtors]
            ELSE IF SUM([joint liability amount]) = 0 AND [outstanding nominal
            amount] > 0 THEN [pro rata debtor share] = 0
            ELSE IF SUM([joint liability amount]) > [outstanding nominal amount]
            THEN [pro rata debtor share] = [joint liability amount] / SUM([joint liability
            amount])
            ELSE IF SUM([joint liability amount]) <= [outstanding nominal amount]
            THEN [pro rata debtor share] = [joint liability amount] / [outstanding
            nominal amount])
    END
END
BY [reference date], [observed agent ID], [contract ID], [instrument ID]
```

Main debtor share

The main debtor is the one with the largest [pro rata debtor share].

For an instrument with a single main debtor (i.e. where one debtor related to the instrument has the largest [pro rata debtor share]), the [main debtor share] is set to 1. If there are multiple main debtors (i.e. several debtors related to the instrument all have the same largest [pro rata debtor share]), the [main debtor share] is 1 divided by the number of the main debtors. Otherwise, the [main debtor share] is set to zero if a debtor is not the main debtor.[28]

In this way, the [instrument balance] is entirely distributed over the main debtor(s) of the instrument, while zero is allocated to debtors which are not main debtors. If there is just one main debtor, the [instrument balance] is entirely assigned to that debtor, while the shares of the remaining debtors are set to zero. If there is more than one main debtor, equal portions of the [instrument balance] are allocated to each one of them and the shares of remaining debtors are set to zero.

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[27] Under the AnaCredit data model, it should be assumed that in such cases there must be at least one natural person who is a debtor under the instrument. The formula allocates half of the instrument to the debtor reported to AnaCredit. As the outstanding nominal amount is zero, no outstanding nominal amount is in the end allocated to the debtor reported to AnaCredit when calculating the BSI aggregate.

[28] This rule may actually identify several main debtors in cases where [pro rata Debtor share] is the same for several debtors, rather than just one. This implies that discrepancies may arise, especially if the specific allocation rules used by institutions for BSI purposes result in just one main debtor. At present, however, such a potential discrepancy is not a concern and the proposed calculation is considered sufficient for purpose. This may be revised in future once more understanding and experience of the accuracy of the methodology has been gathered. The potential discrepancy could be addressed by appropriately widening the lower and upper thresholds.

The [main debtor share] is calculated for each debtor in unique groups by reference date, observed agent and instrument. The calculation is further detailed in the following formula.

The resulting [main debtor share] is calculated separately for each debtor of the instrument, while certain intermediate calculations (such as the number of debtors for the instrument) are performed in unique groups by reference date, observed agent and instrument.

If the [pro rata debtor share] which is input to the calculation of the [main debtor share] is missing, the [main debtor share] resolves to *NULL* for the debtors. concerned

```
IF [pro rata debtor share] is NULL THEN [main debtor share] = NULL
ELSE DO:
    IF [pro rata debtor share] = 0 THEN [main debtor share] = 0
    ELSE IF [pro rata debtor share] = MAX([pro rata debtor share])
    THEN [main debtor share] = 1/COUNTIF([counterparty identifier] WHERE
    ([counterparty role] = “debtor”) AND ([pro rata debtor share] = MAX([pro rata
    debtor share])));
    ELSE [main debtor share] = 0;
END
BY [reference date], [observed agent ID], [contract ID], [instrument ID]
```

3.2.1.3 Data quality index

For a given observed agent, the result of the calculation described in Section 3.2.1.2 is the AnaCredit equivalent value representing total loans to selected euro area residents reported by the observed agent. If the calculation cannot be completed (due to data quality issues, or because no AnaCredit data are actually available even though the submission deadline has passed), no AnaCredit equivalent value is generated.

The AnaCredit equivalent value is evaluated against the BSI benchmark value. The check's data quality index (DQI) quantifies the deviation between the BSI benchmark value and the AnaCredit equivalent value. The DQI is thus a function of the BSI benchmark value and the AnaCredit equivalent value that evaluates whether and to what degree the check condition holds.

The value of the DQI is employed to assess the likelihood that the data may be erroneous: if the deviation between the value of the benchmark and its AnaCredit equivalent value is excessive, this is an indication that AnaCredit data are implausible.

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For specific terminology please refer to the ECB glossary (available in English only).