OESTERREICHISCHE NATIONALBANK
EUROSYSTEM

OeNB‘s Inhouse Credit Assessment System (ICAS): Assessment of Austrian Non-financial Corporations‘ Creditworthiness

Gerhard Winkler

May 5th, 2016

Outline

- Eligible Collateral in Monetary Policy Operations
- Risks associated with the Value of the Collateral
- Structure of the ICAS
- Statistical Models
- Expert Model and Group Framework
- Rating Decision and Publication
- The Common Credit Assessment System (CoCAS)

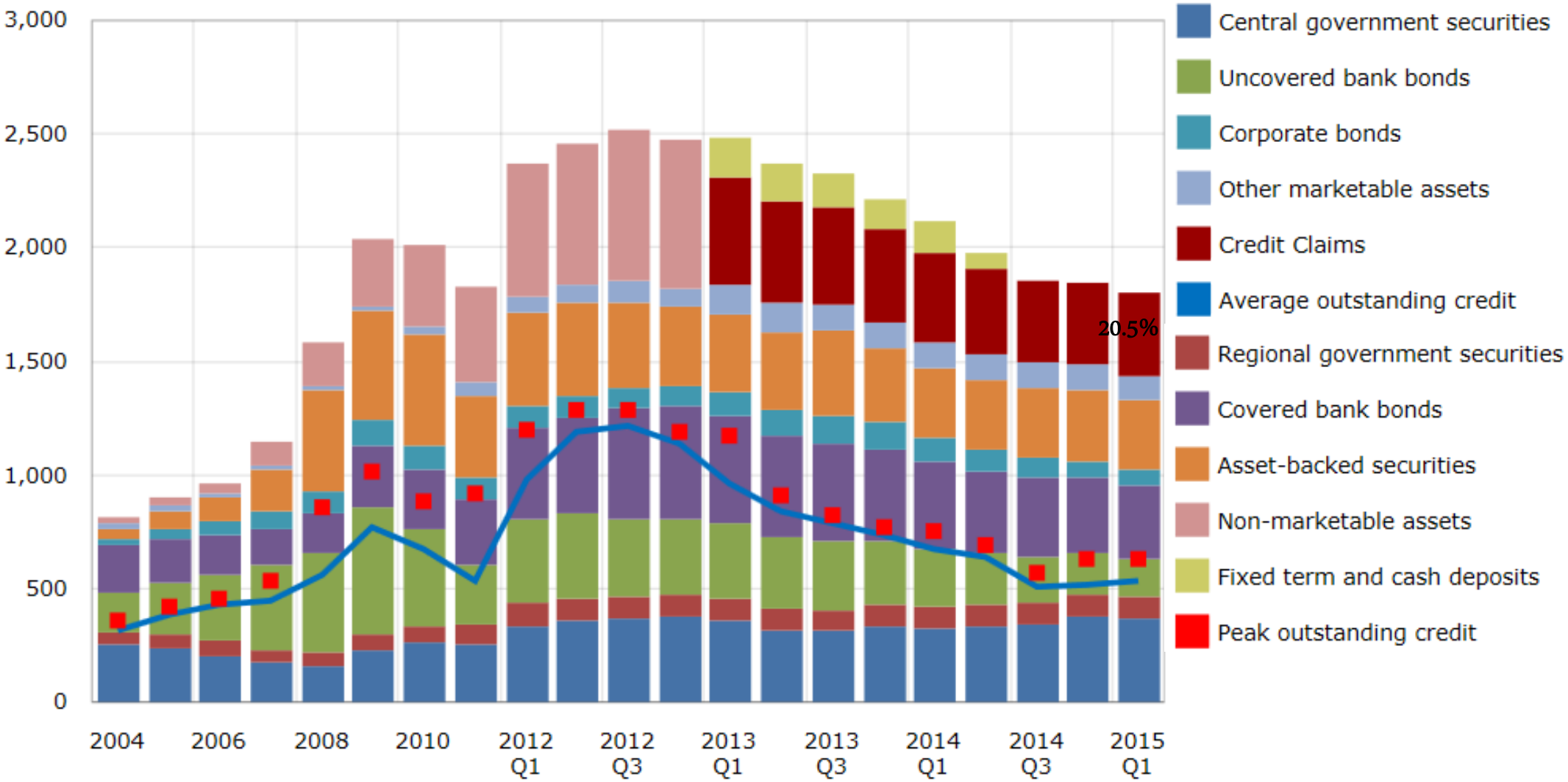
ELIGIBLE COLLATERAL IN MONETARY POLICY OPERATIONS

Overview of the collateral accepted by central banks

Collateral	Eurosystem	BoE	Riksbank	SNB	Fed	BoJ
Marketable assets						
Debt instruments issued by:						
Central governments	√	√	√	√	√	√
Central banks	√	√	√	√		
Public sector institutions other than central governments	√	√	√	√	√	√
Supranational institutions	√	√	√	√		√
Credit institutions (covered bonds)	√	√	√	√		
Credit institutions (excluding covered bonds)	√	√		(√)		
Corporations (other than credit institutions)	√	√	√	√		√
Asset-backed securities (ABS)	√	√				√
Equities						
Money market funds						
Gold						
Non-marketable assets						
Credit claims (bank loans)	√					√
Non-marketable retail mortgage-backed debt instruments	√	√				
Cash as collateral						
Cash including fixed-term deposits from eligible counterparties	√					

Source: ECB, Report on collateral frameworks, July 2013

Development of the use of collateral



Source: ECB https://www.ecb.europa.eu/paym/coll/charts/html/index.en.html

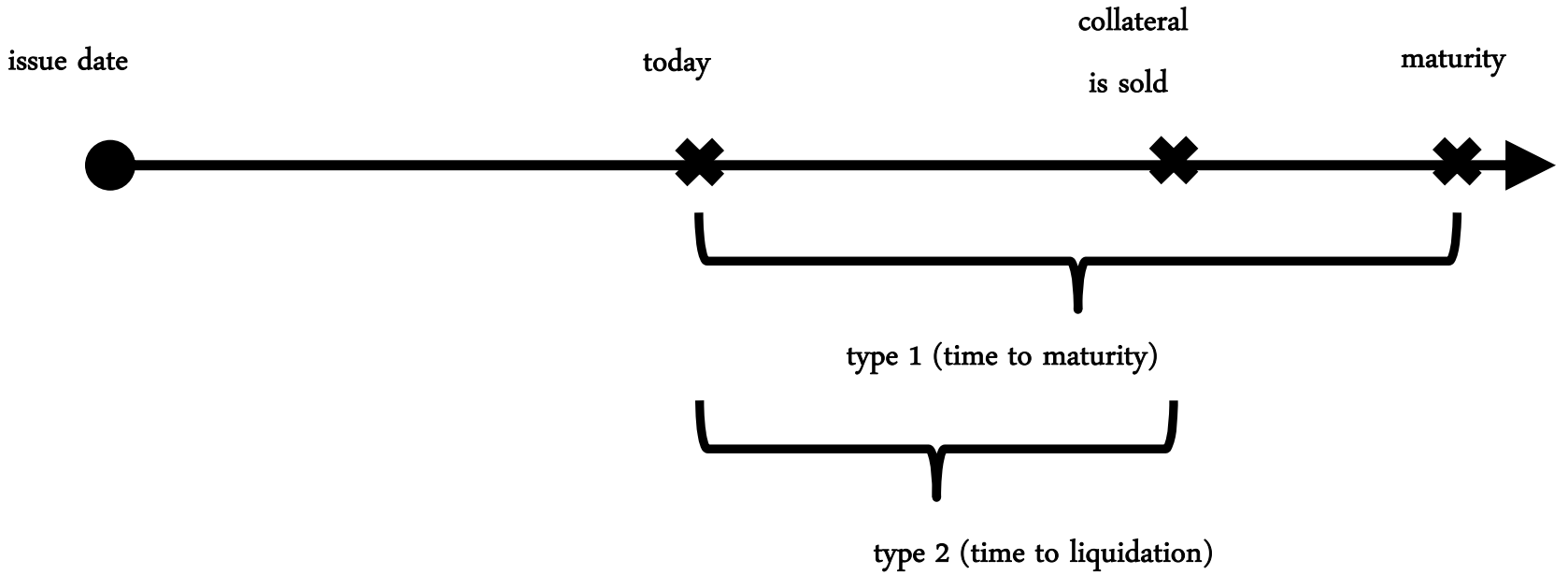
RISKS ASSOCIATED WITH THE VALUE OF THE COLLATERAL

Risks 1/2

There are two types of uncertainty:

1. Uncertainty with respect to the **correct value of the claim** at the point the collateral is pledged (assume this is today)
2. Uncertainty/Risk from changes in value **until the collateral is sold** by the central bank

Risks will be market risk, credit risk and liquidity risk. → For all risks the time dimension is relevant:

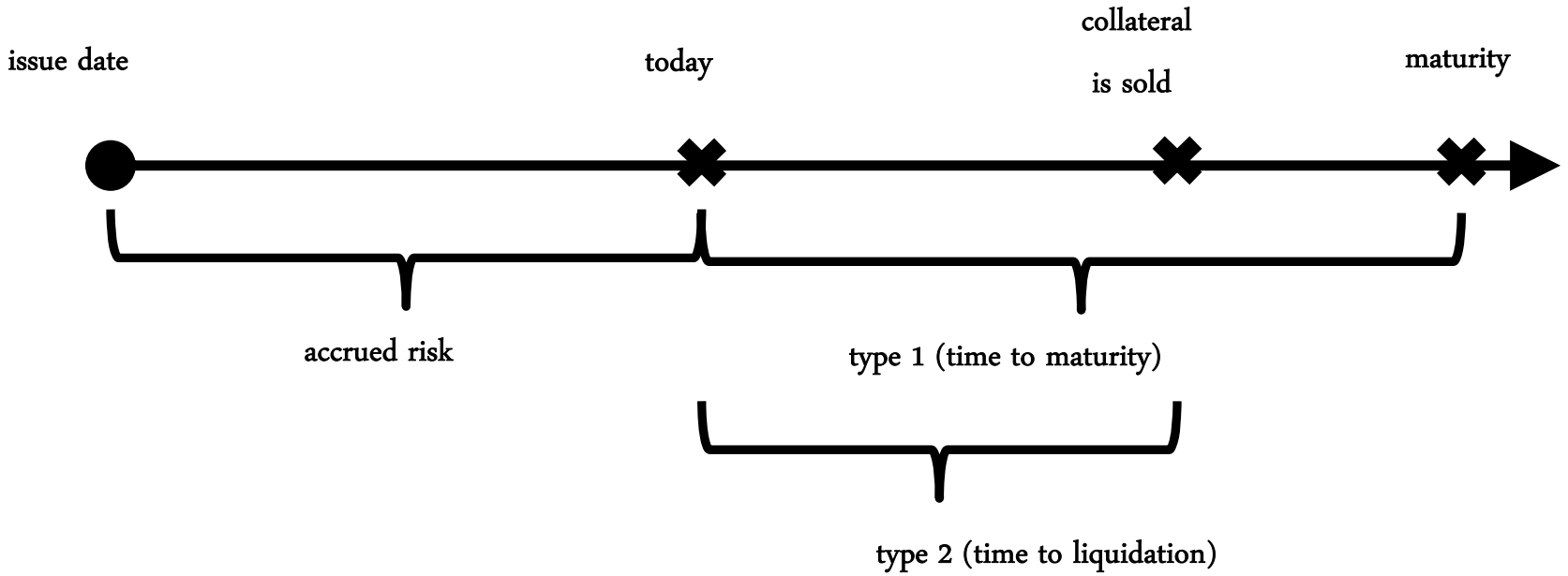


Risks 2/2

If all features (coupon type/dates, maturity, rating, etc.) of the claim are known, **uncertainties of type 1 can be eliminated**!

Uncertainties of type 2 and model risk cannot be eliminated!

Without a pricing model, the valuation can be based on the **outstanding amount!** However, risk factors will have changed since the original issue date (**accrued risk**).



Snapshot: Haircut Regime of the Eurosystem

Levels of valuation haircuts applied to credit claims with fixed interest payments

Credit quality	Residual maturity (years)	Valuation methodology	
		Fixed interest payment and valuation based on a theoretical price assigned by the NCB	Fixed interest payment and valuation based on the outstanding amount assigned by the NCB
Steps 1 and 2 (AAA to A-)	0-1	8,0	10,0
	1-3	11,5	17,5
	3-5	15,0	24,0
	5-7	17,0	29,0
	7-10	18,5	34,5
	> 10	20,5	44,5
Step 3 (BBB + to BBB-)	0-1	15,5	17,5
	1-3	28,0	34,0
	3-5	37,0	46,0
	5-7	39,0	51,0
	7-10	39,5	55,5
	> 10	40,5	64,5

It caters for:

- the time to maturity
- the credit risk
- the valuation methodology

Source: ECB http://www.ecb.europa.eu/ecb/legal/pdf/02011o0014-20130103-en.pdf

Snapshot: Haircut Regime of the Eurosystem

Levels of valuation haircuts applied to credit claims with fixed interest payments

Credit quality	Residual maturity (years)	Valuation methodology	
		Fixed interest payment and valuation based on a theoretical price assigned by the NCB	Fixed interest payment and valuation based on the outstanding amount assigned by the NCB
Steps 1 and 2 (AAA to A-)	0-1	8,0	10,0
	1-3	11,5	17,5
	3-5	15,0	24,0
	5-7	17,0	29,0
	7-10	18,5	34,5
	> 10	20,5	44,5
Step 3 (BBB + to BBB-)	0-1	15,5	17,5
	1-3	28,0	34,0
	3-5	37,0	46,0
	5-7	39,0	51,0
	7-10	39,5	55,5
	> 10	40,5	64,5

difference in haircuts should cater for risks of type 1

Market and liquidity risks are captured by the haircut regime.

However, credit risk must be measured since the haircut regime and the eligibility itself depends on it!

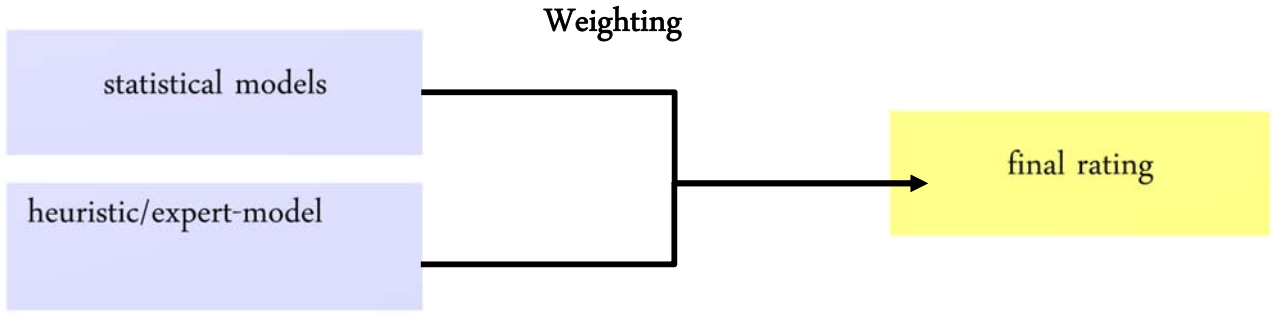
STRUCTURE OF THE ICAS

Structure of the ICAS 1/2

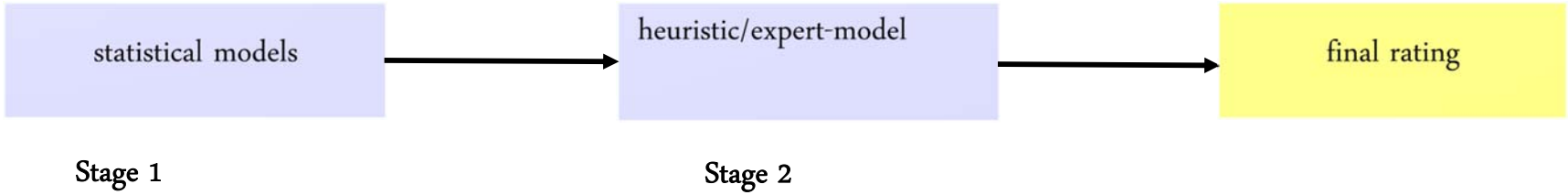
- The ICAS consists of:
  - A standardised rating process, that was defined according to the internal rules of the Eurosystem and uses (several) statistical models as well as a heuristic / expert-based model;
  - an IT-application, which was jointly developed by OeNB and Deutsche Bundesbank (BBk) and is operated by BBk.
- Approx. 6000 ratings are assigned by the OeNB-ICAS every year.
- OeNB‘s ICAS uses 12 FTEs to perform this task.
- Due to limited resources, ratings cannot be discussed with rated entities.

Structure of the ICAS 2/2

- The ICAS is a hybrid rating system
- typical structure of a hybrid rating system
  - type 1: the expert-model delivers an absolute result :



  - type 2: the expert-model delivers a relative result:



The OeNB-ICAS uses type 2!

STATISTICAL MODELS

The Statistical Models 1/2

- Stage 1 (statistical models):
  - It delivers a „base-rating“, the so-called classification/rating proposal.
  - It is based on chosen, statistically identified, purely quantitative aspects.
  - For IFRS-consolidated groups of companies a model with 6 ratios is used.
  - For NGAAP-(consolidated) group of companies or entities 12 different models are in use.:
    - NGAAP-groups
    - Metal and Car Industry
    - Chemístry/Ceramics/Tobacco
    - Other Material Goods
    - Real Estate Sector
    - Construction Industry
    - Tourism
    - Wholesale
    - Retail
    - Business related services
    - Transport
    - Others
  - Every NGAAP-Model consists of a basic model with 4 ratios and 3 sector-specific ratios.

The Statistical Models 2/2

- The rating result:
  - The result of the rating model (stage 1) is a (probit) score, that is mapped onto one out of the seventeen distinct rating classes of the CoCAS master scale.
  - Every rating class is defined by a score interval and is associated with one (!) specific PD.
  - The analyst (stage 2) may confirm the (statistical) rating proposal.
  - However, the analyst may alternatively overrule the (statistical) rating proposal by notching up or down on the master scale.
  - By deciding on a final rating (class) the analyst implicitly assigns the final PD estimate.

EXPERT MODEL AND GROUP FRAMEWORK

The Expert Model 1/3

- Stage 2 (expert model and group framework):
  - The analyst makes the final decision and delivers the final rating.
  - The final rating considers further quantitative information and – even more important – qualitative information.
  - The final rating may (but does not have to) comply with the classification proposal.

The Expert Model 2/3

- The expert model consists of 8 categories.
- Every category has to be dealt with and evaluated by the analyst.
- Assessment result per category: + / 0 / - („+“ means a notching up by one rating class at the 19-grade master scale, „-“ means a notching down of one rating class).
- The classification of the statistical model can be changed up to a maximum of 8 rating classes.

➔ Uniform approach of the analysts

➔ All relevant aspects of the analysis are covered

➔ Traceability of the final rating result

The Expert Model 3/3

The 8 categories are:

- Company / Market
- Balance sheet and Income statement
- Statistical model
- Trend analysis
- Benchmarking Model
- Ownership / Holding structure
- Additional information
  - e.g. ownership structure, foreign company relationships, press releases, quarterly reports, quality of the documents, etc.
- Analysis of the opinion of third parties (ratings by CRAs and IRB-banks)

Group Framework

- If an entity belongs to a group of companies (fully consolidated subsidiary), the rating of the group is relevant for the final rating.

- The group rating is directly used as the rating of the parent company (a separate analysis if the parent company is not conducted).

- **As a general principle, the individual financial statement should not be better rated than the consolidated financial statement.**
  - Individual financial statements are better rated than consolidated financial statements: the rating of the company must be reduced to the group rating.
  - Individual financial statements are rated worse than consolidated financial statements: the final rating class of the subsidiary will be increased by a maximum of three rating classes (rating ceiling is the rating of the group).
- Adjustment of the validity date
  - The validity of a group rating is relevant for the subsidiary in order to maximize its expiration date.

Approval Process

- **Four-Eyes-Principle**: Every rating is approved by a second independent person (analyst and approver are equally authorized in the decision-making process).

- **Rating Committee:** a rating is topic to the rating committee, if

  - there are divergences between the rating after the expert model (and group framework) and the judgement of the analyst.
  - the analyst and the approver cannot agree on the final rating.

DATA SOURCES, RATING DECISION AND PUBLICATION

Data Sources

The operation of an ICAS requires various kinds of micro-data:

- Reference data:
  - Identifiers, Name, Address, Legel Form, Nace, Sector,...
  - Ownership & Group Structure
- Financial Statements:
  - All financial statements that are available in the Austrian commercial register, are also available for the OeNB.
  - For the purpose of the balance sheet statistics, the direct investment statistics and the credit assessment every year 26,000 Austrian non-financial companies are requested by letter to transmit their financial statements.
  - Commercial banks deliver the financial statements for the purpose of the credit assessment.
- Credit Register:
  - Information on volumes and risk (PD, EL, RWA, LGD, Defaults;...)
  - 1500 Reporting agents report on a monthly basis exposures above threshold of 350.000 EUR
  - Harmonisation expected in near future: AnaCredit
- Various additional information:
  - CRA, ratings, press releases, ...

Rating Decision

To use the limited resources as efficient as possible, not every entity will be rated.

Currently the following evaluation criteria exist:

- The entity is among the 500 largest Austrian companies in terms of turnover.
- The entity establishes a consolidated financial statement (i.e. is a company group).
- The rating of the entity is requested by a commercial bank (precondition: a loan has already had to be granted by the commercial bank).
- The entity has bank loans or issued bonds in excess of 500 TEUR.

Publication

- To avoid systemic risk, commercial banks do not have access to all rating results.
- Commercial banks, that are approved for monetary operations, have only access to the list of eligible entities.
- It does not contain the concrete rating result.
- **Thus, a rated entity does not have a disadvantage, if the ICAS leads to a classification of not eligible, as the commercial banks are not informed.**
- Pursuant to Austrian data protection law entities have the right of self-information and OeNB has to inform rated entities upon request.

THE COMMON CREDIT ASSESSMENT SYSTEM (COCAS)

CoCAS 1/2

- CoCAS is a web application, that was jointly developed for the purpose of credit assessment of IFRS-groups of companies by OeNB and Deutsche Bundesbank (BBk) and is operated by BBk.
- CoCAS has standardized interfaces for the import of:
  - Master data
  - Additional data (e.g. further rating-relevant information and/or payment behaviour)
  - Annual financial statements
  - Default data
- CoCAS has standardized interfaces for the export of:
  - Rating data
  - Calibration data (whole database)
- CoCAS provides menu guidance in English and German. Therefore it is also usable for other NCBs.

CoCAS 2/2

- CoCAS is in terms of the following aspects configurable (by uploading of an excel sheet):
  - The taxonomy of the financial statements (all positions as well as the structure and possible checking rules)
  - The used models (calculation of ratios and statistical rating)
- Because of this flexibility CoCAS is usable for any accounting standard and any model class.
- Users of CoCAS:
  - OeNB: IFRS-group model (since 03/2011) and NGAAP models (since 03/2012)
  - BBk: IFRS-group model (since 03/2011) and NGAAP models (since 04/2014)
  - Banque Nationale de Belgique/Nationale Bank van België: IFRS-group model (since 01/2014)
  - Banco de Espana: IFRS-group model (since 01/2012)
  - Banco de Potugal: IFRS-group model (since 01/2016)

Contact Information

Gerhard Winkler
Head of Supervisory Statistics, Models,
and Credit Quality Assessment Division
Oesterreichische Nationalbank
Otto-Wagner-Platz 3
A-1090 Vienna

gerhard.winkler@oenb.at
T: +43-1-40420-4900
F: +43-1-40420-4999

Annex

METHODOLOGY IN MORE DETAIL

The Statistical Models 1/4

- Model development consists of 3 phases:
  - Phase 1: Creation of the consensus rating (on the basis of secondary ratings, for example: IRB- and ECAI-ratings):
    - aggregation of available rating information taking into account raterspecific errors.
    - (Note: The consensus rating
      - Is not just a rating of a third or a weighted average of ratings, but
      - an unbiased und efficient estimate for the true latent ratings!)
  - Phase 2: Explanation of the consensus score:
    - By sector-specific „nested regression model“ on the basis of balance sheet ratios.
  - Phase 3: (actual) calibration (PD level adjustment) and validation of the models:
    - Integration of the default information and the possible correction of the PD-level

The Statistical Models 2/4

- Advantages of the model:
  - It takes into account **raterspecific errors** (consensus score – Step 1).
  - It does not only distinguish between **„default“** and **„non-default“** but also uses **available rating information** about „non-defaulters.
  - It uses the (potential) information advantage of the banks.
  - It enables calibration also on **low default portfolios** (Step 2).
  - The model result is **closer to the average market opinion** than those derived with traditional methods (logit model, discriminant analysis, SVM).
  - Default information is not omitted, but used in the calibration/validation (Phase 3) – this reduces systemic risk.
  - The model adheres to the more restrictive Basel II / ECAF default definition.
  - The model uses the whole of the specific and unique data-treasure of a central bank.

The Statistical Models 3/4

- For every entity (exactly: every annual financial statement) a consensus rating is estimated on the basis of the available rating information.

- Following fundamental thoughts are of importance:
  - Traditional methods (LOGIT, DA, SVM, etc.) are based on the „assumption“, that the precision of the estimate for true, but latent PDs will increase if the number of observations for each distinct level of credit risk is increased.
  - The consensus-PD-method is based on the „assumption“, that the precision of the estimate for true, but latent PDs will increase if the number of raters which simultaneously asses a single entity increases.

  ➔ Our approach combines the ideas/advantages of both methods (in Steps 1 and 3).

The Statistical Models 4/4

- Structure of the NGAAP-models:

$$S_i = \alpha_s + \gamma_s[\alpha_{Gr} + \beta_{1i}g_{1i} + \beta_{2ig2i} + \beta_{3ig3i} + \beta_{4ig4i}] + \beta_{1six1si} + \beta_{2six2si} + \beta_{3six3si}$$

S_i : Ratingscore of entity i

$\alpha_s, \beta_{.sj}$: Coefficients of the sector model

γ_s: Coefficient of the base model in the sector model

β_i, α_{Gr}: Coefficients of the base model

g_i: ratios of the base model for entity i

$x_{.si}$: sector ratios for entity i

- Simply put, the calibration methodology of the ICAS ensures, that the ICAS-model is „as close as possible to the market“ and still is correctly calibrated (to defaults).

- Because of the model „market opinions“ can be predicted, even if there is no actual rating information of secondary sources available!