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SESSION 3. THE EMERGENCE OF INTERNAL MODELS IN BANKING SUPERVISION: IMPLICATIONS FOR THE REGION

A BENCHMARKING MODEL

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Supervisory benchmarking approaches

Objective: The prompt **identification of outliers** for its subsequent analysis…

…by **comparing** the results of the IRB model of the portfolio under analysis with those obtained through either:

Direct comparison with peers

- **External references** (public LGDs, ECAI Ratings, …).
- **Results obtained for comparable portfolios previously analysed.** This comparison is particularly useful for supervisors given their access to all entity's information under its jurisdiction, facilitating the execution of the benchmark.

The approach involves the following main challenges:

- **Internal definitions may be heterogeneous** (default, loss, segmentation,…).
- **The identification of homogenous risk groups** may not be straightforward.

Use of a reference model

- **Using an alternative model** to obtain benchmark results for that particular portfolio.
- In this case, it is specially valuable if a **supervisory model** is used.

The approach involves the following main challenges:

- **Data limitations:** Required inputs may not be readily available.
- **Balance between sophistication** (ability to capture idiosyncratic factors) **and complexity** (allowing feasible implementation)

In all cases, **identifying the reasons behind the differences requires an in-depth knowledge** of the entity's **idiosyncrasies** and their **internal risk management policies and procedures** (admission policies, ongoing risk monitoring, recovery processes, etc.) as well as of the **methodological assumptions** behind each of the models and the appropriateness of the external references

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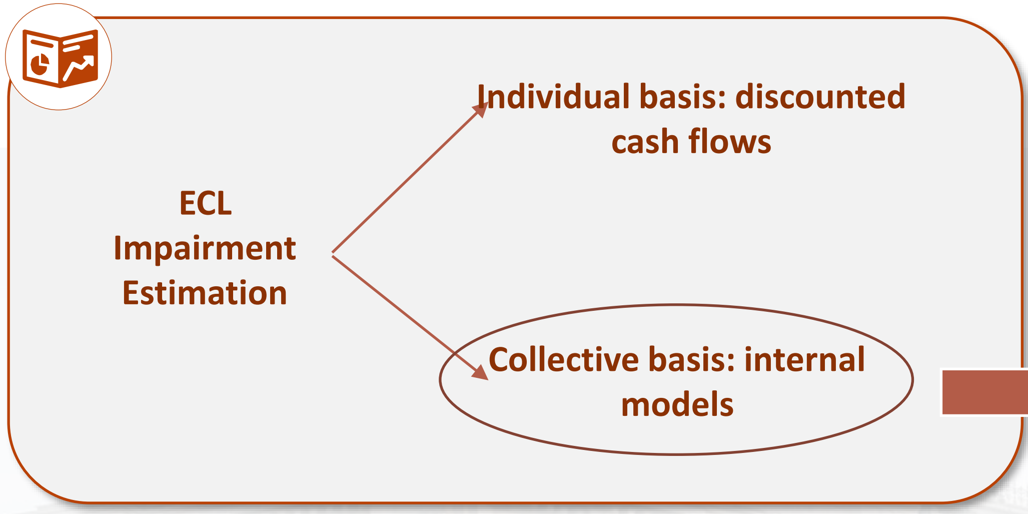
IFRS9 vs IRB

When comparing IRB models and those aligned with IFRS9 standards, their main core differences should be carefully taken into account

	IRB	Comparison	IFRS 9
Objective	Unexpected losses		Expected losses
	Reasonably stable losses throughout the economic cycle (long-run)		Conditional loss - at the moment in the economic cycle (point-in-time)
	Conservative estimates		Unbiased estimates
Regulation	Rule-based: CRR EBA RTS / EBA Guidelines ECB Guidelines		Principle-based
Methodology	Closed calculation formula: only calculation of inputs is required Strict requirements (data and specifications)		Open methodology
Reference approach	Standardised Approach		N/A
Floors	Floors to internal models own funds requirements		N/A

For IFRS9, Spain opted to create a Supervisory model given the greater flexibility and potential variability in relation to ECL estimations

ECL impairment alternative solutions



Banco de España developed its own internal ECL model, which was then **incorporated into the Accounting Circular** with a two-fold objective:

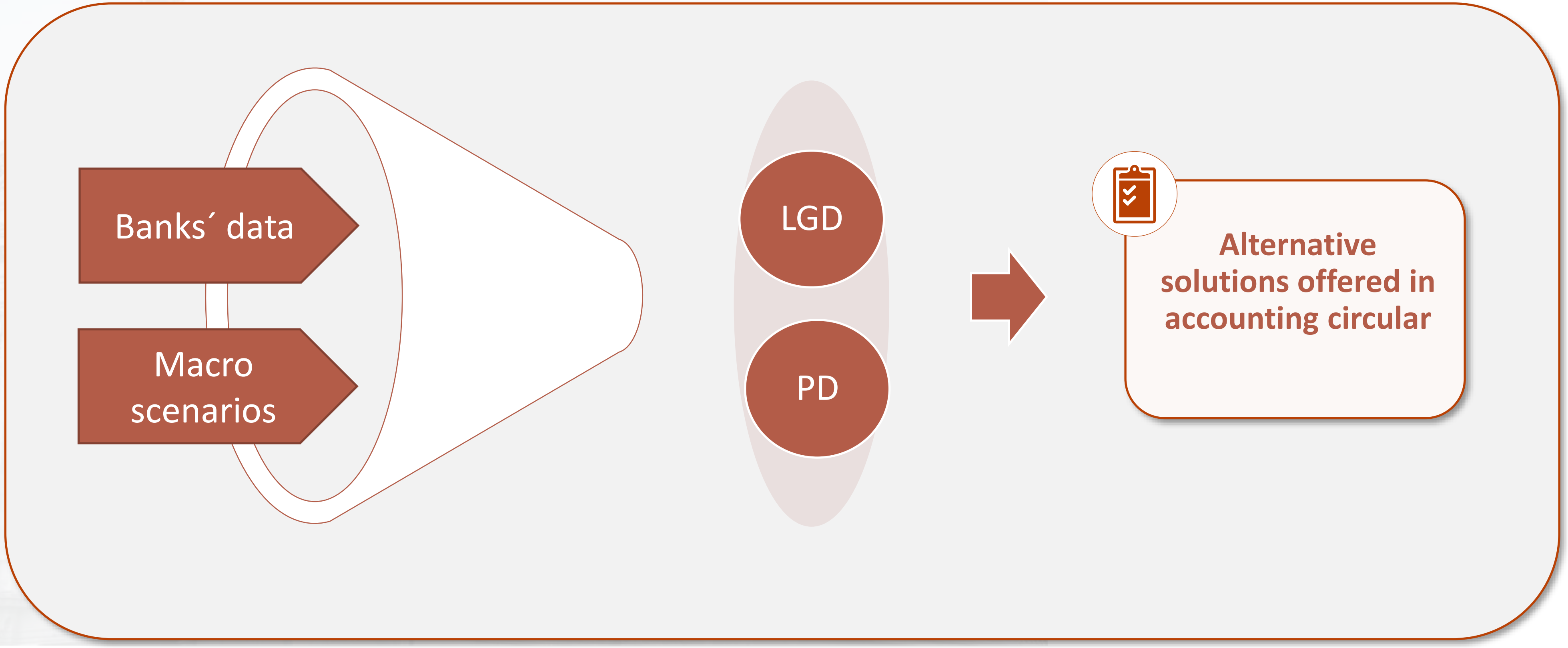
- ✓ As an **alternative solution** to developing internal models. Particularly directed to those less complex entities based in **principles of proportionality**.
- ✓ As a **benchmark for supervisory review.** Facilitating comparison across entities and the identification of **outliers** when comparing internal estimations vs. alternative solutions.

The Supervisors' use of proportionate approaches within ECL accounting frameworks was contemplated by the Basel Committee:

"Consistent with the **Basel Core Principles**, the Committee recognizes that **supervisors may adopt a proportionate approach** with regard to the standards that supervisors impose on banks and the conduct of supervisors in the discharge of their own responsibilities. The use of properly designed proportionate approaches should not jeopardized the high-quality implementation of the ECL accounting frameworks; rather, their use should enable banks to adopt sound allowance methodologies **commensurate with the size, complexity, structure, economic significance, risk profile** and, more generally, all other relevant facts and circumstances of the bank and the group (if any) to which it belongs." (*GRAECL – paragraph 11*)

Alternative solution’s estimation process overview

inputs → calibration → output



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Alternative solutions - Inputs

inputs → calibration → output

Inputs and sources

- ✓ **Central Credit Register:** Database of credit records of natural and legal persons, which collects information from direct risks (loans and credits) and indirect (collateral and guarantees) for any amount exceeding 6,000 euros that credit institutions have with their clients.
- ✓ **Loan tape:** Granular accounting data (operations, clients, collaterals, provisions) used by BdE inspectors to match with institutions' balance sheet.
- ✓ **Foreclosed assets inventory:** Detailed characteristics of foreclosed assets owned by Spanish institutions: location, appraisals…
- ✓ **Sales of foreclosed assets:** Register of foreclosed assets already sold by institutions, collecting its date and price of sale.
- ✓ **Macroeconomic scenarios**

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Alternative solutions - Calibration

inputs → **calibration** → output

PD x LGD

- ✓ PD differentiated by Stages (1, 2 & 3).
- ✓ LGD scheme based on cure rates.
- ✓ Applied to exposure not covered by effective collateral.
- ✓ Adjustment using forward-looking information from macroeconomic scenarios (correlation of macro variables with PD/LGD)
  - Estimates conditioned to macroeconomic scenarios
  - Equivalent years approach

Alternative solutions - Calibration: PD

inputs → **calibration** → output

PD x LGD

- ✓ PD differentiated by Stages (1, 2 & 3).
- ✓ LGD scheme based on cure rates.
- ✓ Applied to exposure not covered by effective collateral.
- ✓ Adjustment using forward-looking information from macroeconomic scenarios (correlation of macro variables with PD/LGD)
  - Estimates conditioned to macroeconomic scenarios
  - Equivalent years approach

Reference date: Stage 1/Stage 2 population

1Y PD

2Y PD

3Y PD

t | T+12 months | T+24 months | T+36 months

Alternative solutions - Calibration: LGD (1/2)

inputs → **calibration** → output

PD x LGD

- ✓ PD differentiated by Stages (1, 2 & 3).
- ✓ **LGD scheme based on cure rates.**
- ✓ Applied to exposure not covered by effective collateral.
- ✓ Adjustment using forward-looking information from macroeconomic scenarios (correlation of macro variables with PD/LGD)
  - Estimates conditioned to macroeconomic scenarios
  - Equivalent years approach

Defaulted assets → Cured (P(Cure)) → LGD = 0%

Defaulted assets → Not cured (1-Prob(Cure)) → LGD = 100% over non-collateralized exposure

Probability of cure (P(Cure)): For Stage 1 and Stage 2 assets, probability of going back to normal situation after default (exit rates from non-performing loans)

Alternative solutions - Calibration: LGD (2/2)

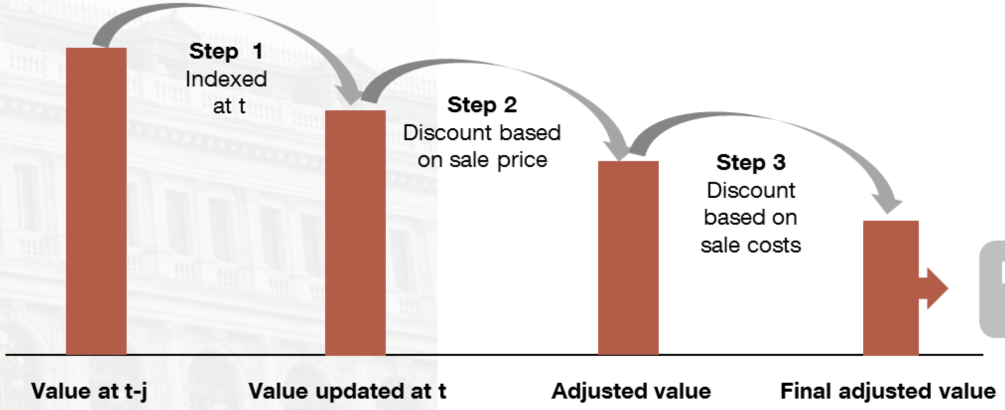
inputs → calibration → output

PD x LGD

- ✓ PD differentiated by Stages (1, 2 & 3).
- ✓ LGD scheme based on cure rates.
- ✓ Applied to exposure not covered by effective collateral.
- ✓ Adjustment using forward-looking information from macroeconomic scenarios (correlation of macro variables with PD/LGD)
  - Estimates conditioned to macroeconomic scenarios
  - Equivalent years approach

- **Collateralized exposures:** Estimation of recoverable amount of collateral (considering costs and changes in appraisal values until sale): estimated % of discounts on appraised value of different types of collaterals, using reported information on collateral appraised value, date of appraisals, price of sales and date of sales.

Example of discount -> collateral with appraised value at t-j and sold at t:



Final collateral value

- **Non-collateralized exposure (LGD = 100%)** = Exposure – Reference value of collateral x % Discount

Alternative solutions - Output

inputs → calibration → **output**

Allowances and provisions for the amount not covered by effective collateral (%)	Stage 1	Stage 2
Non-financial corporations and sole proprietorships specialised financing		
for the financing of real-estate construction and property development, including land	1,9	27,6
For financing the construction of civil works	1,9	18,8
other specialised financing	0,5	7,5
Non-financial corporations and sole proprietorships non specialised financing		
Large corporations (a)	0,5	7,5
SMEs	0,9	12,7
Sole proprietorships	1,1	11,6
Households		
For residence purchase	0,6	13,0
Consumer credit (except credit cards)	1,5	16,0
Credit cards	0,8	9,0

	Age of past due-amounts						
Allowances and provisions for the amount not covered by effective collateral (%)	Over 90 days, but not exceeding 6 months	Over 6 months, but not exceeding 9 months	Over 9 months, but not exceeding 1 year	Over 1 year, but not exceeding 15 months	Over 15 months, but not exceeding 18 months	Over 18 months, but not exceeding 21 months	Over 21 months
Non-financial corporations and sole proprietorships specialised financing							
for the financing of real-estate construction and property development, including land	60	70	80	85	90	100	100
For financing the construction of civil works	55	65	70	75	85	90	100
other specialised financing	50	60	70	85	90	100	100
Non-financial corporations and sole proprietorships non specialised financing							
Large corporations (a)	50	60	70	85	90	100	100
SMEs	55	65	70	80	85	90	100
Sole proprietorships	30	40	50	60	75	90	100
Households							
For residence purchase	40	45	55	65	75	90	100
Consumer credit	50	60	70	80	90	95	100

- ✓ % discount on appraised value applied to different collaterals
- ✓ % to be applied on the exposure not covered by collateral, for each segment:
  - % coverage in Stage 1 (12-month PD*LGD)
  - % coverage in Stage 2 (Lifetime PD*LGD)
  - % coverage in Stage 3 (LGD)

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Key take-aways

- ✓ **Benchmarking** is one of the most **powerful supervisory tools** in the field of credit risk supervision.
- ✓ One possibility is the development of **internal supervisory benchmarking models**, however:
  - ✓ It is very conditioned to the availability of **data.**
  - ✓ It is **resource-consuming.**
  - ✓ It requires an adequate **balance between its complexity and specification**, i.e. being able to adapt to the idiosyncrasies of each entity/portfolio without greatly increasing the model's complexity.
- ✓ In any case…
  - ✓ It should be **used with caution** and with the objective of promptly identifying **outliers.**
  - ✓ Additional qualitative information and an **in-depth knowledge of the entity** is needed to adequately interpret results.

Thank you for your attention

ANNEX

BANCO DE ESPAÑA: DIRECTORATE GENERAL SUPERVISION AND INTERNAL MODELS

Banco de España – Organisation Chart

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Directorate General Supervision

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- **Governor** *Pablo Hernández de Cos*
  - Internal Audit
  - Communication
  - Chief of Staff
  - **Deputy Governor** *Margarita Delgado*
    - Directorate General Economics, Statistics and Research
    - Directorate General Financial Conduct and Banknotes
    - Directorate General Financial Stability, Regulation and Resolution
    - Directorate General Operations, Markets and Payment Systems
    - Directorate General Services
    - **Directorate General Banking Supervision**
      - Associate Directorate General Banking Supervision I
        - Significant Institutions I
        - Significant Institutions II
        - LSIs and Institutions outside the SSM
      - **Associate Directorate General Banking Supervision II**
        - **Inspections, Internal Models and IT Innovation**
          - SI Inspections I Division
          - SI Inspections II Division
          - SI Inspections III Division
          - IT risk and Suptech Inspections Division
          - **Internal Models Division** → 30 people
          - Money Laundering Prevention Division
        - Horizontal Functions
    - General Secretariat

Multi-disciplinary team with a mix of profiles:

- ✓ Economists
- ✓ Inspectors
- ✓ Specialists
- ✓ Information Technology Experts

Significant Institutions in Spain

Spanish Financial Institutions

10 Significant Institutions

72 Less significant Institutions

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	Banco Santander	BBVA	CaixaBank	Banco Sabadell	Bankinter	Unicaja	Abanca	Kutxabank	Cajamar	Ibercaja
Assets[(1)] (EUR bn.)	> 1,000	500-1,000	300-500	150-300	75-100	50-75	50-75	50-75	30-50	30-50
ICAAP Models	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IFRS9 Models	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IRB Models	✓	✓	✓	✓	✓	✓	*Roll-out*	*Roll-out*	*Roll-out*	*Roll-out*

Internal IRB model map

EXAMPLE

		PD	*LGD*	*EAD*
HDP	*Mortgages*	✓	✓	✓
	Consumer Loans	☒	☒	☒
	SME	✓	✓	✓
LDP	*GE*	✓	✓	✓
	FI	✓	☒	☒

Financial entities develop their internal IRB models following a sequential roll-out plan until covering all exposures, including both High Default Portfolios (HDP) and Low Default Portfolios (LDP).

Final-phase of IRB model's development

First approval of internal credit risk models in Spain took place in **2008** (with a pre-evaluation process starting in 2006).

Overall, Spanish entities **undergo 1 to 3 inspections per year**, either triggered by material changes in the models or the approval of new models (roll-out).

(1) As of January 1st 2022 (link)