EBA 2021 Stress Test for Dutch Mortgages: A Tough Squeeze for the Orange

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Today's Speakers

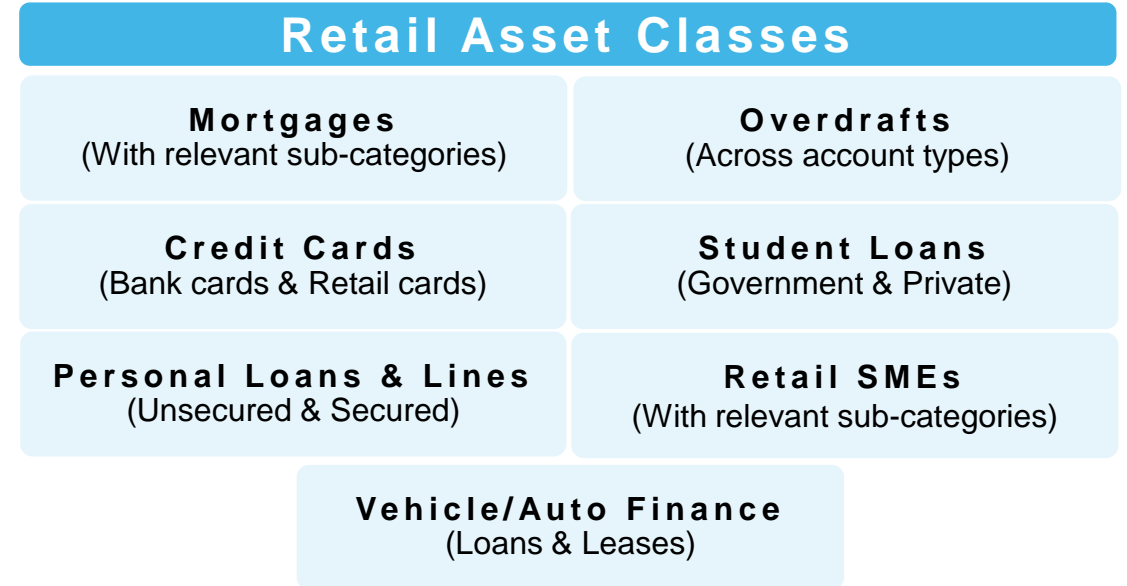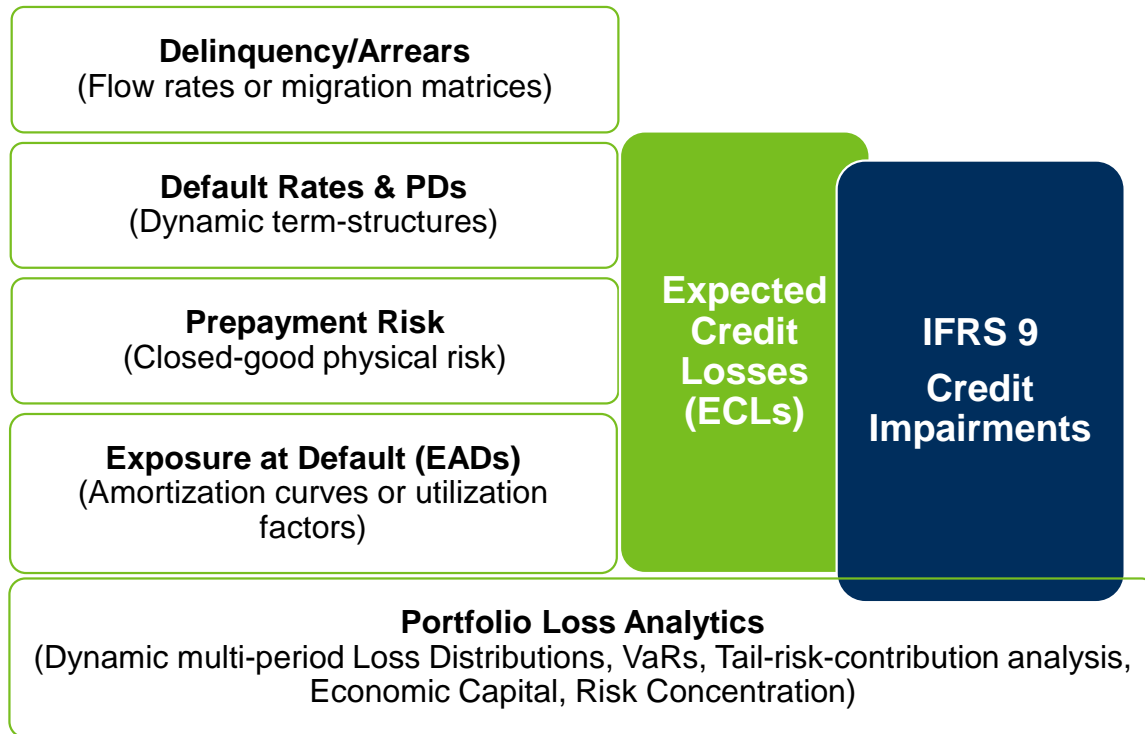Economics & Business Analytics

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Director

Portfolio Analyser (PA) Suite of Models

Retail loan-level econometric models for credit and impairment metrics

Delinquency/Arrears
(Flow rates or migration matrices)

Default Rates & PDs
(Dynamic term-structures)

Prepayment Risk
(Closed-good physical risk)

Exposure at Default (EADs)
(Amortization curves or utilization factors)

Expected Credit Losses (ECLs)

IFRS 9 Credit Impairments

Portfolio Loss Analytics
(Dynamic multi-period Loss Distributions, VaRs, Tail-risk-contribution analysis, Economic Capital, Risk Concentration)

Retail Asset Classes

Mortgages (With relevant sub-categories)	**Overdrafts** (Across account types)
Credit Cards (Bank cards & Retail cards)	**Student Loans** (Government & Private)
Personal Loans & Lines (Unsecured & Secured)	**Retail SMEs** (With relevant sub-categories)

Vehicle/Auto Finance
(Loans & Leases)

Webinar

1. EBA 2021 Stress Test

2. Dutch Representative Portfolio

3. Projections of PDs & LGDs

4. Forecasting EBA Risk Parameters

5. Capital Implications
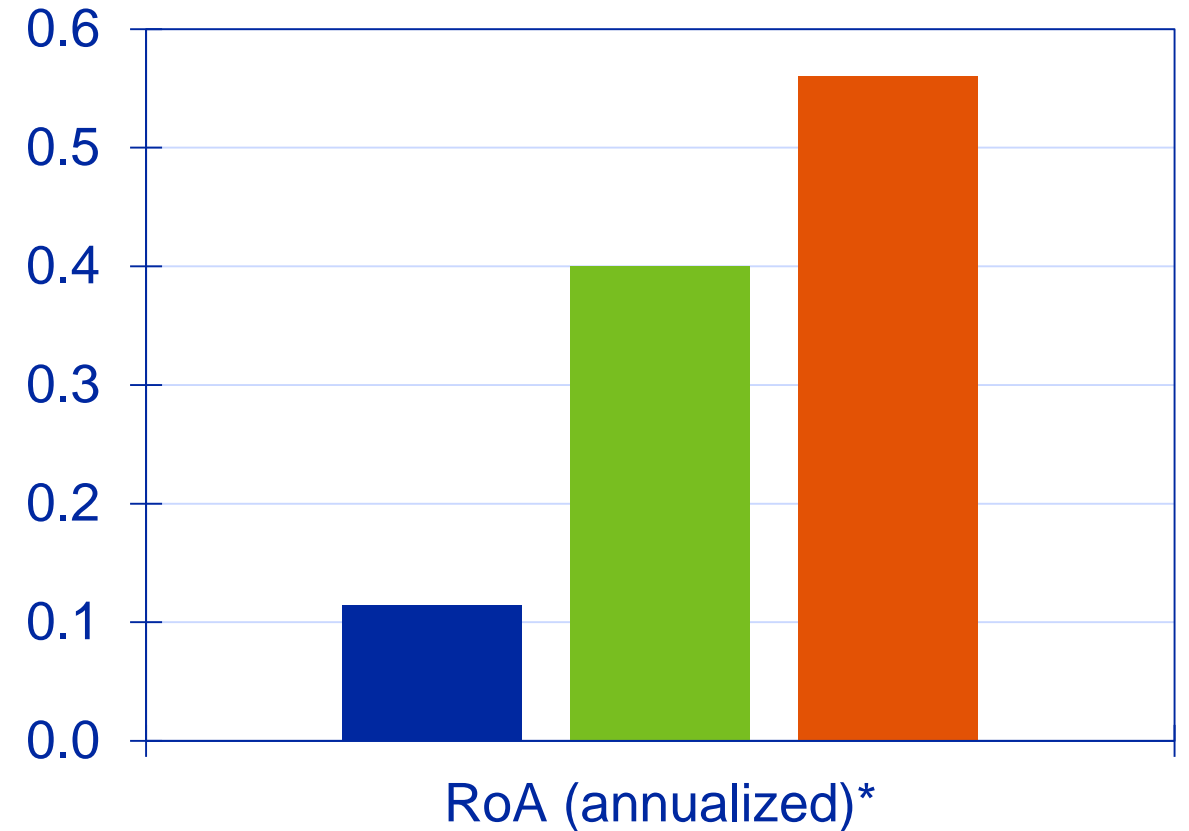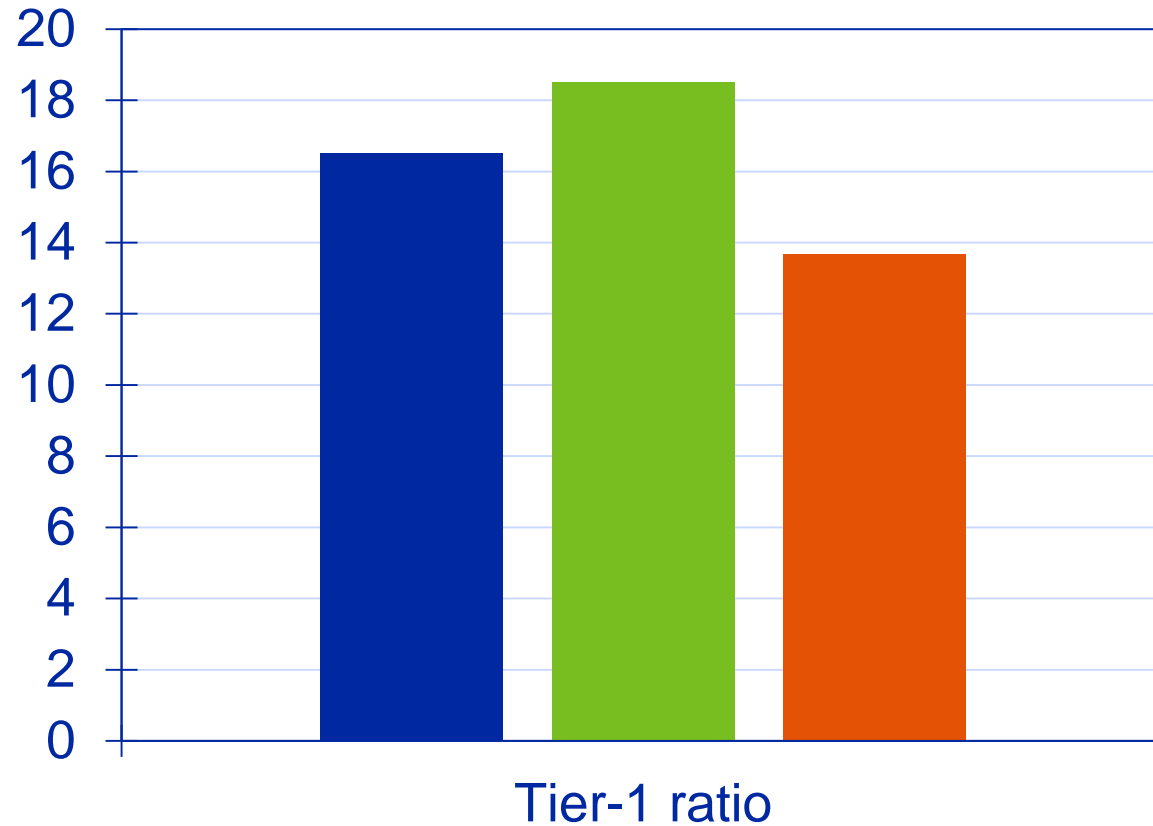
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EBA 2021 Stress Test

EBA 2021 Stress Test
Introduction

» Launched on January 29, 2021

» The adverse scenario is based on a narrative of a prolonged COVID-19 scenario in a 'lower for longer' interest rate environment, in which negative confidence shocks would prolong the economic contraction

» The adverse scenario reflects ongoing concerns about the possible evolution of the COVID-19 pandemic coupled with a potential strong drop in confidence;

» The stress scenario is designed to ensure an adequate level of severity across all EU countries;

» The EU-wide stress test is being conducted on a sample of 50 EU banks covering 70% of total banking assets in the EU

» The EBA expects to publish the results of the exercise by 31 July 2021.

Banking Systems Stable, Profitability Low

Commercial banks, 2020Q3, %

Legend: ■ Euro zone ■ U.K. ■ U.S.

Left chart: Tier-1 ratio — Euro zone ≈16.5, U.K. ≈18.5, U.S. ≈13.7 (axis 0–20)

Right chart: RoA (annualized)* — Euro zone ≈0.11, U.K. ≈0.40, U.S. ≈0.56 (axis 0.0–0.6)
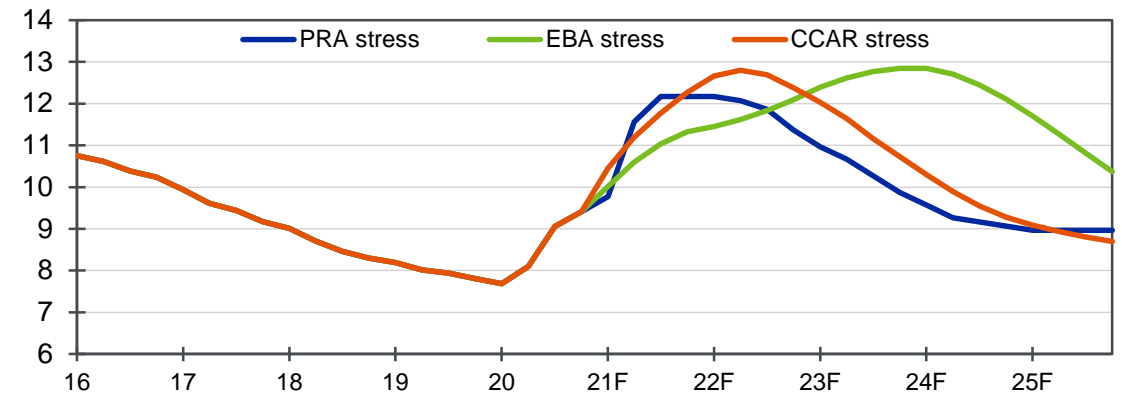
*as of 2020Q2 for euro zone and U.K.

Sources: Fed, ECB, BoE, Moody's Analytics
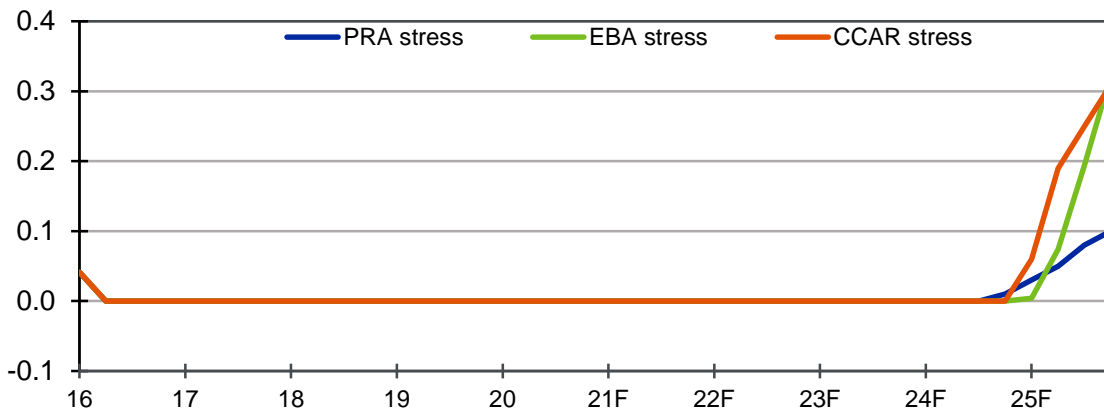
Euro Zone Stress Test Scenario Forecasting
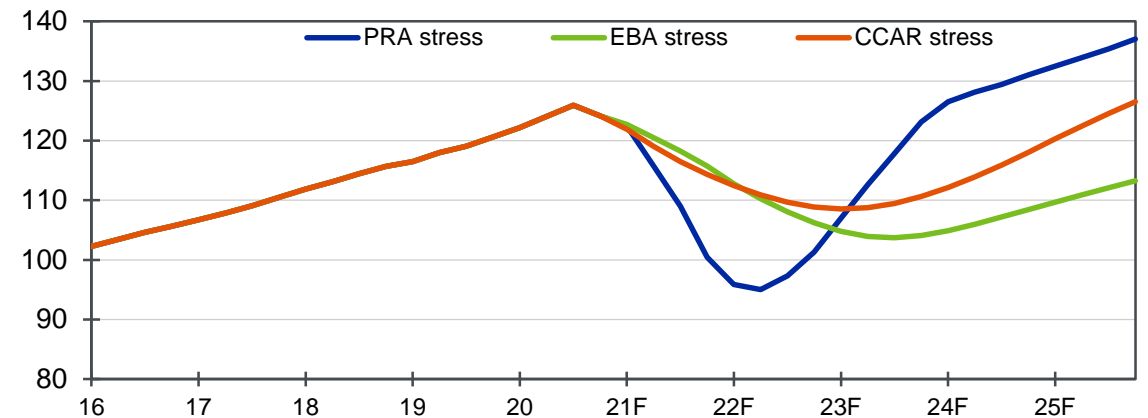
Real GDP, Bil. Ch. 2010 EUR, CDASAAR

Legend: PRA stress, EBA stress, CCAR stress

Unemployment Rate, %

Legend: PRA stress, EBA stress, CCAR stress

Monetary Policy Rate, %

Legend: PRA stress, EBA stress, CCAR stress
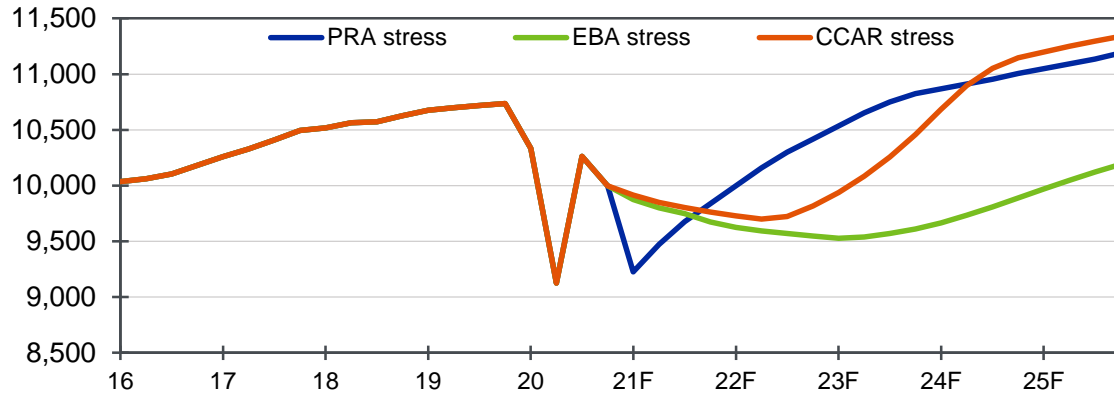
House Price Index, Index 2015=100, SA

Legend: PRA stress, EBA stress, CCAR stress

Sources: Fed, EBA, PRA, Moody's Analytics

Macroeconomic Drivers
EBA Projections

Real GDP										
		Historical growth (%)	Baseline growth (%)			Adverse growth (%)			Cumulative growth from the starting point(%)	Minimum growth from the starting point growth (%)	Level deviation 2023 (%)
		2020	2021	2022	2023	2021	2022	2023			
Netherlands	NL	-4.3	2.9	2.9	1.9	-1.3	-2.3	-0.6	-4.3	-4.3	-11.3
Euro area	EA	-7.3	3.9	4.2	2.1	-1.5	-1.9	-0.2	-3.6	-3.6	-12.9
European Union	EU	-6.9	3.9	4.2	2.3	-1.5	-1.9	-0.2	-3.6	-3.6	-12.9

Unemployment rate										
		Historical value (%)	Baseline rate (%)			Adverse rate (%)			Cumulative growth from the starting point	Maximum growth from the starting point growth (p.p.)	Level deviation 2023 (p.p.)
		2020	2021	2022	2023	2021	2022	2023			
Netherlands	NL	4.0	6.5	6.0	4.6	7.0	9.5	10.0	6.0	6.0	5.4
Euro area	EA	8.0	9.3	8.2	7.5	10.4	11.5	12.4	4.5	4.5	4.9
European Union	EU	7.4	8.7	7.7	7.1	10.0	11.2	12.1	4.7	4.7	5.0

Note: The tables reports annual averages.
Note: Projections from the NCBs are used as baseline forecasts for EU countries. For non-EU countries, the baseline projections are based on projections from the October 2020 IMF WEO.

Real Estate Prices & Interest Rates
## EBA Projections

Residential real estate prices										

		Historical growth (%) 2020	Baseline growth (%)			Adverse growth (%)			Cumulative growth from the starting point(%)	Minimum growth from the starting point growth (%)	Level deviation 2023 (%)
			2021	2022	2023	2021	2022	2023			
Netherlands	NL	7.1	2.0	1.1	2.5	-4.4	-9.8	-5.5	-18.5	-18.5	-22.9
Euro area	EA	4.7	2.1	2.1	2.8	-3.9	-8.2	-4.5	-15.7	-15.7	-21.4
European Union	EU	4.9	2.2	2.1	2.9	-3.9	-8.4	-4.7	-16.1	-16.1	-21.9

Long-term interest rates							

		Starting point rates (%) 2020	Baseline rates (%)			Adverse rates (%)		
			2021	2022	2023	2021	2022	2023
Netherlands	NL	-0.32	-0.43	-0.36	-0.28	-0.96	-0.64	-0.64
Euro area	EA	0.04	-0.11	0.01	0.13	0.02	0.17	0.18
European Union	EU	0.18	0.01	0.13	0.24	0.61	0.73	0.71

Note: The tables reports annual averages.
Note: For real estate prices, projections from the NCBs are used as baseline forecasts for EU countries. For non-EU countries, the baseline projections are based on projections from the October 2020 IMF WEO.

Netherlands Forecasts
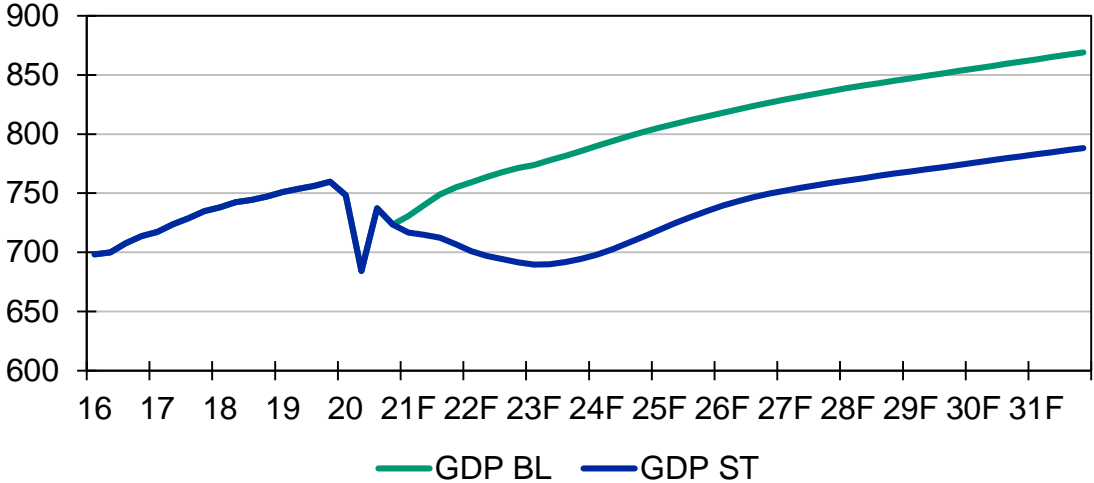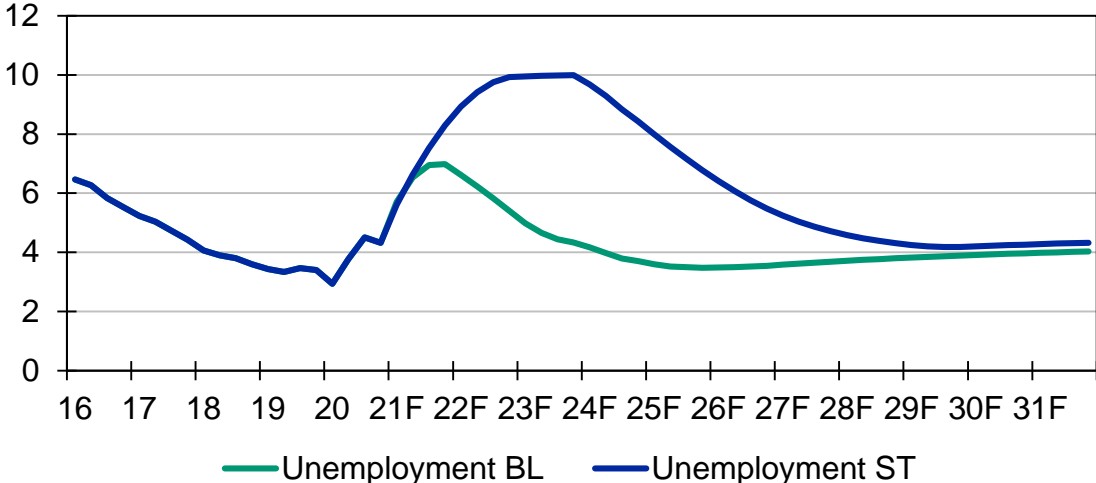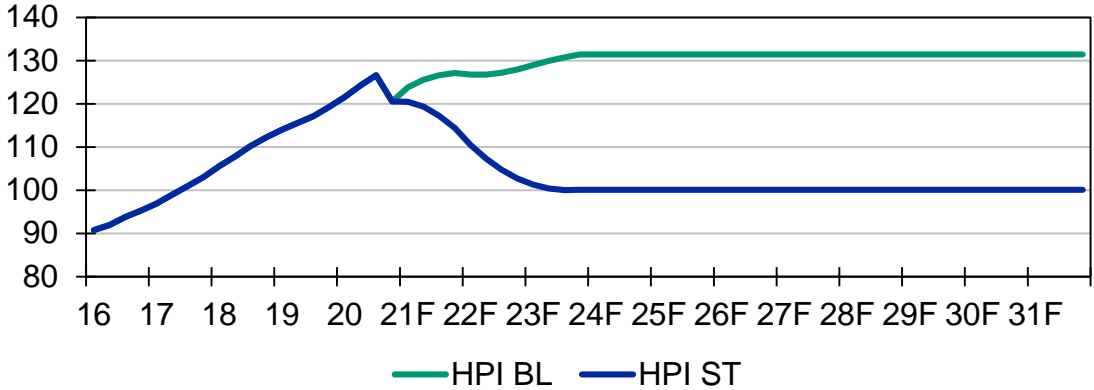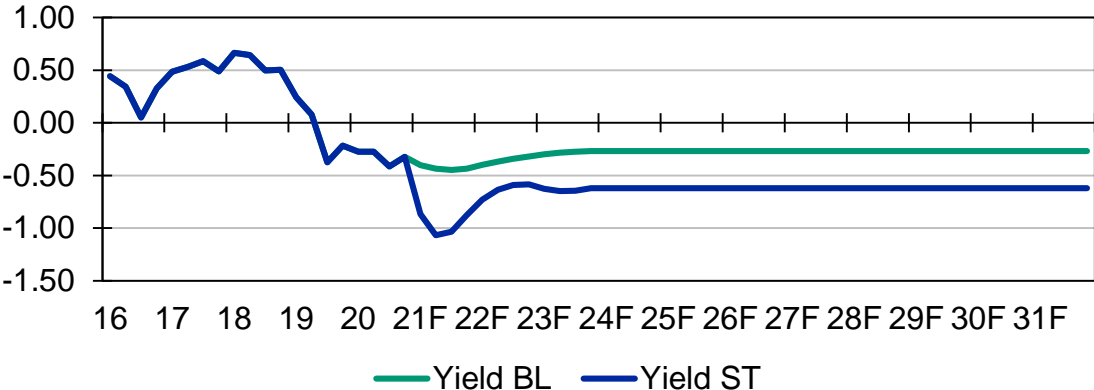
2 | Dutch Representative Portfolio

Rich Loan-level & Regional Macroeconomic Data

For more than 2M master loans & 3.8M loan parts, EDW
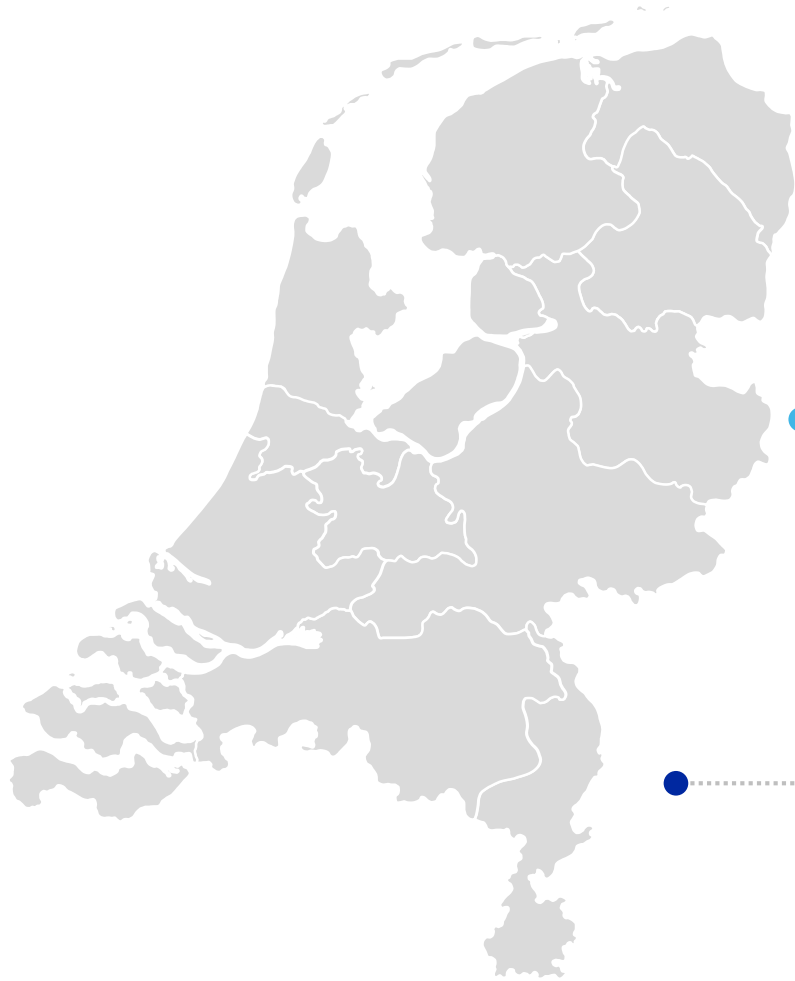
Borrower characteristics

Employment status, primary/secondary income, borrower age and income

Loan characteristics & performance

Mortgage type, payment type, loan-to-value, interest rate, loan term, origination balance, purchase price, occupancy/property/purpose type, geographic region, NHG guarantee

Monthly remaining balance, arrears status, prepayment, current interest rate and default date.
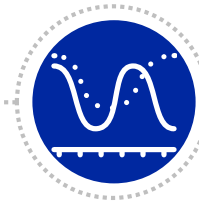
Macroeconomic data

Home prices, unemployment, interest rates

December 2020 Data – Characterizing the loans

» The data available consists of 818,653 mortgages totaling an outstanding balance of EUR 71,891,011,230.

» There are 1,150 non-performing loans, which represents 0.14% of the book.

» 64.8% of mortgages are interest only. Most other mortgages are either annuity or savings mortgages.

» Nearly 70% of customers are employed, whilst an additional 6.8% are self-employed and 5.7% are pensioners.

IFRS9 Stage

Stage	Value
1	99.39%
2	0.47%
3	0.14%

Delinquency Status

Status	Value
Current	99.64%
30DPD	0.17%
60DPD	0.05%
Defaulted	0.14%

Mortgage Type

Type	Value
Interest Only	64.8%
Annuity	18.5%
Savings	14.3%
Linear	2.4%

Employment Status

Status	Value
Not Provided	16.7%
Employed	69.4%
Pensioner	5.7%
Self-Employed	6.8%
Student	0.0%
Unemployed	1.4%
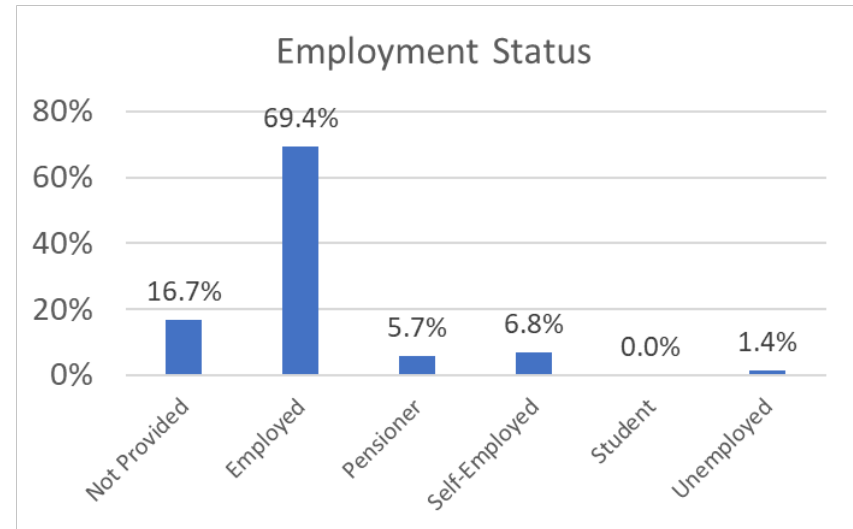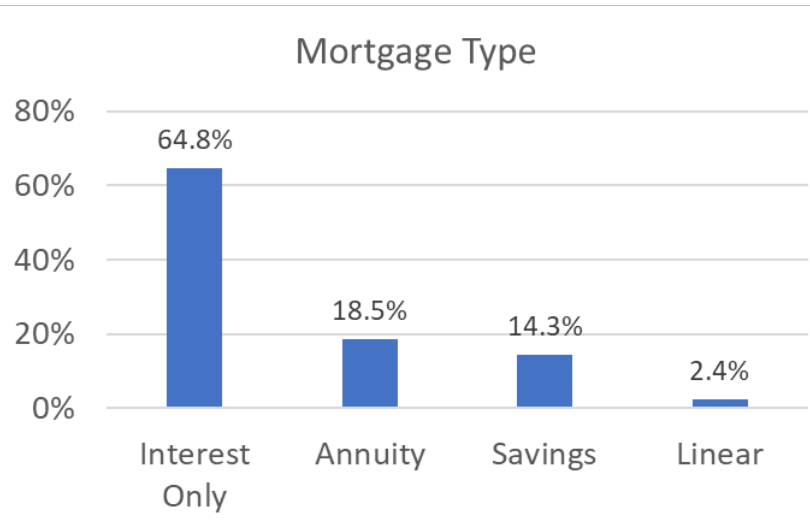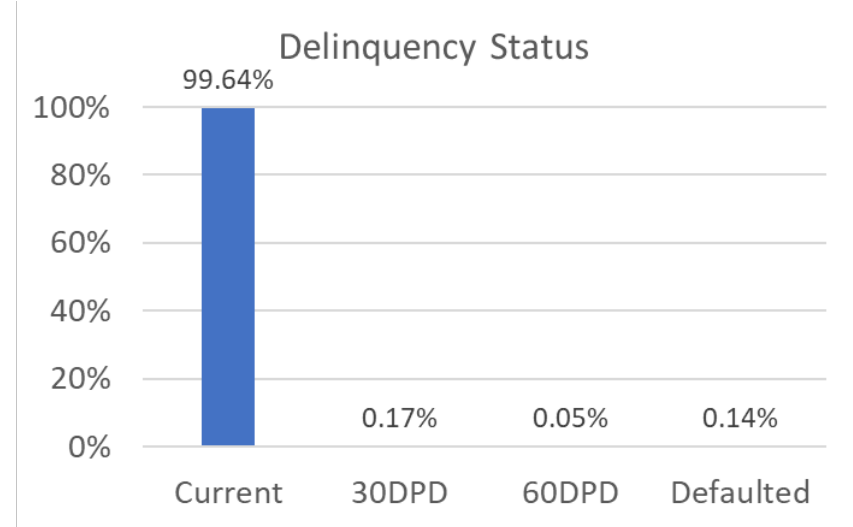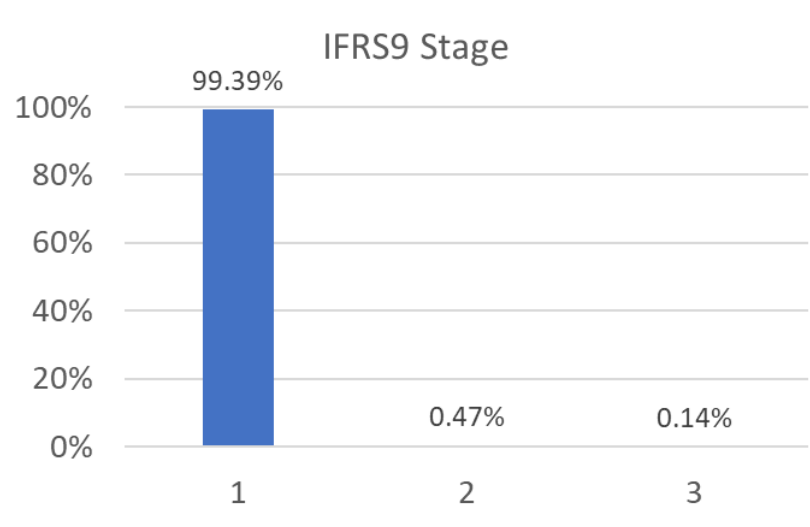
December 2020 Data – NHG Indicator by Province

NHG Indicator

Province	New	None	Old	
Drenthe	3,175	12,298	716	16,189
Flevoland	2,732	7,918	451	11,101
Friesland	3,574	13,281	786	17,641
Gelderland	9,677	51,024	1,906	62,607
Groningen	3,163	10,189	1,099	14,451
Limburg	7,312	29,745	1,903	38,960
Noord-Brabant	10,743	63,713	2,380	76,836
Noord-Holland	23,546	101,883	4,538	129,967
Nederland	22,649	336,577	14,280	373,506
Overijssel	6,573	27,770	1,360	35,703
Utrecht	4,567	27,231	901	32,699
Zeeland	1,652	7,075	266	8,993
	99,363	688,704	30,586	818,653

Accounts split by Province and NHG Indicator
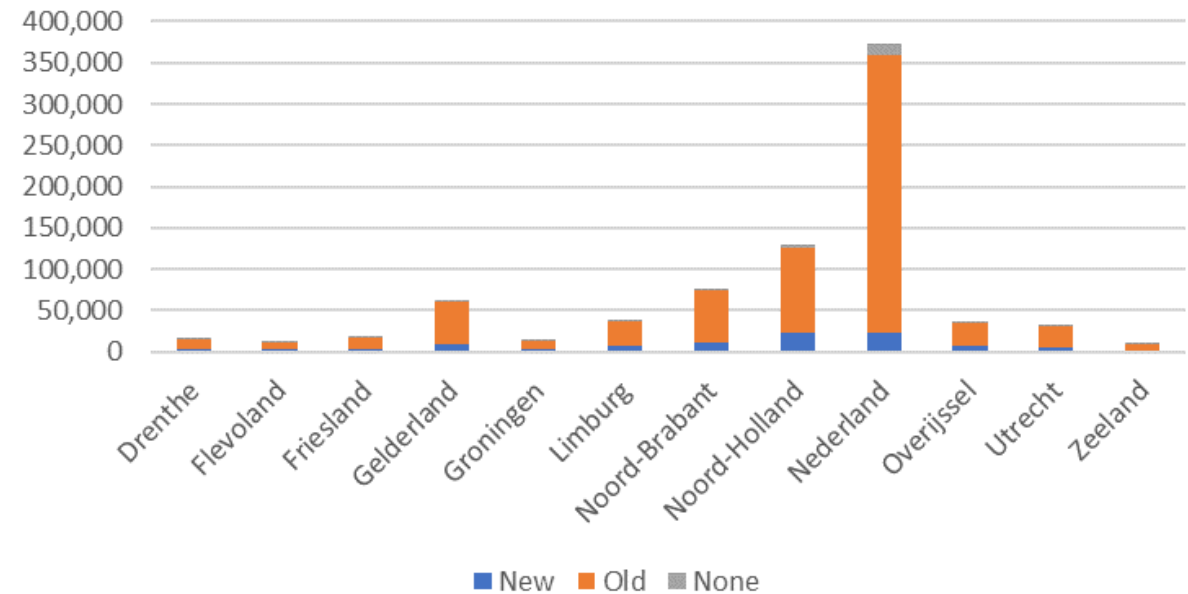
"New" means NHG is after Jan 2013 and is under new coverage rule.
"Old" means NHG belongs to amortizing regime of pre-2013 policies.

December 2020 Data – Balance Distribution by NHG Indicator

» There is a clear variation between the balance distributions of accounts with and without NHG.

» Larger balances typically appear on NHG accounts.

» There is little difference between the distributions of old and new NHG accounts. The variation here is attributable to the age difference between portfolios.

Balance Distribution for Accounts split by NHG Indicator
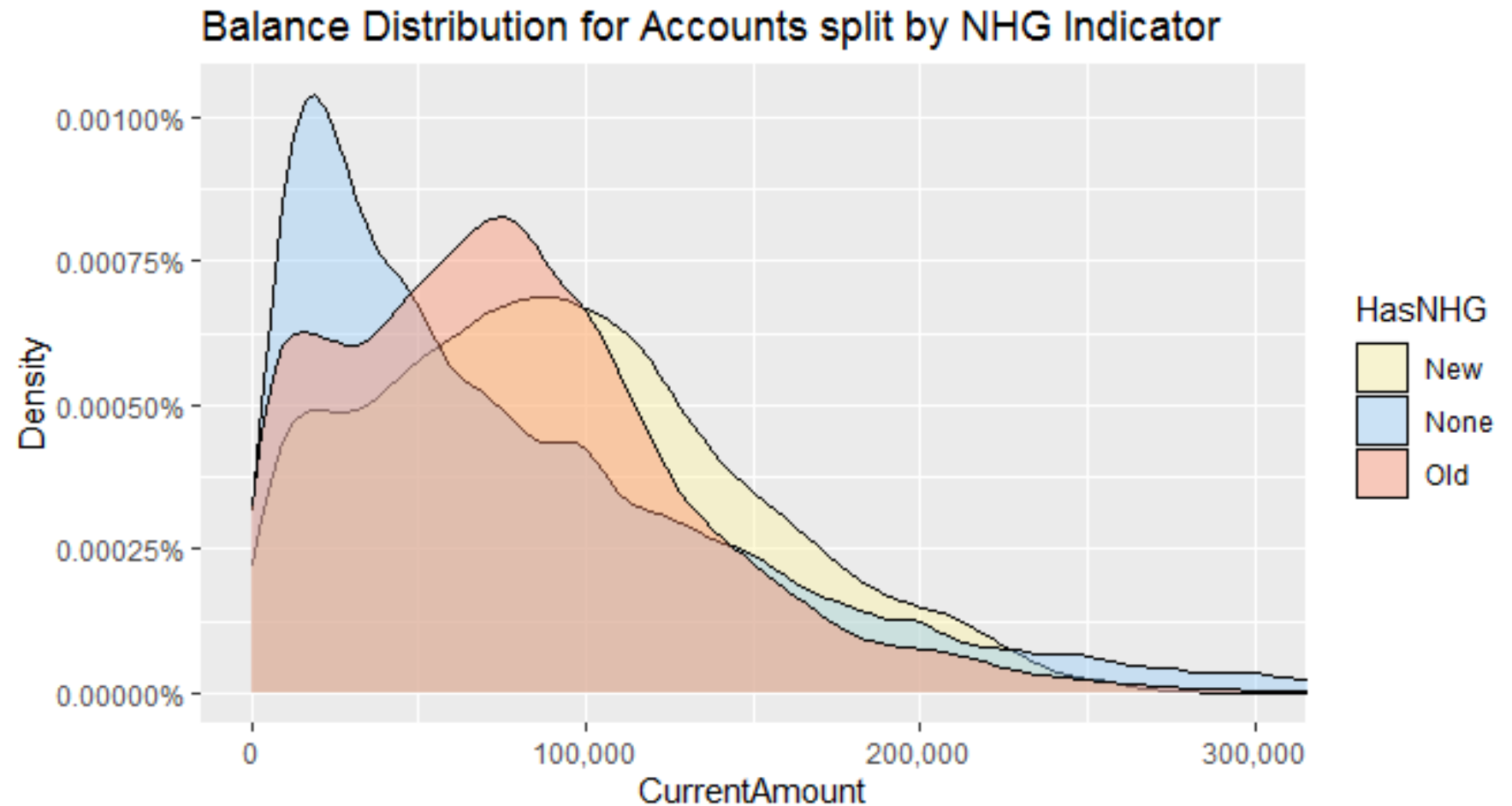
December 2020 Data– LTV Analysis

» Non-NHG accounts have a notably lower average LTV, which appears logical given the lower balance distribution seen on the previous slide.

» Again, there is little variation between old and new NHG accounts.

» There is also little variation between the LTVs of IFRS9 stages 2 and 3, with volatility in the figures explaining any differences here.

NHG Indicator	IFRS9 Stage		
	1	2	3
None	68.6%	98.5%	100.8%
Old	96.0%	106.3%	103.0%
New	95.0%	102.1%	101.7%

3 | Projections of PDs & LGDs

Modular Structure for Consumer Loans Analysis

The case of Dutch Mortgages using Moody's MPA

FACTORS

MODELS

OUTPUT

Economic Data

Loan Level Data

Default/Prepayment

LGD

EAD

Staging, Impairment Calculations & Forecasts

Risks simulations, cash-flow calculations

Account-level, forward-looking, scenario-conditional cash-flows

Scenario projections for risk metrics such as ECL, Loss Distribution, Credit VaR
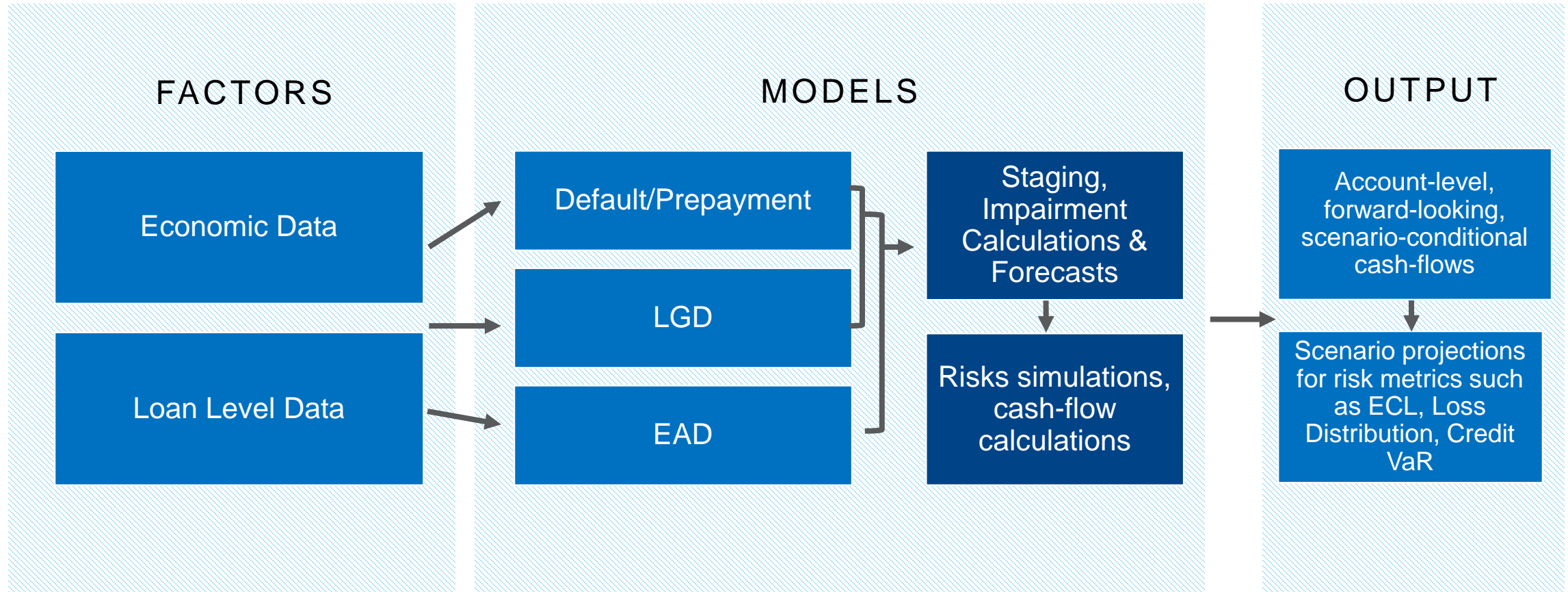
Data with Projections – 12-month PD Analysis

Data split by accounts with and without NHG

» Here we plot 12-month PD projections over the next three years.

» Under the EBA Baseline, the rates remain relatively stable throughout the forecast period. There is little variation in the rates between accounts with and without an NHG.

» Under the EBA Stress scenario, the PD increases significantly for both portfolios in 2022 as unemployment spikes. Based on the macroeconomic scenario, PDs would not be expected to return to pre-pandemic levels until towards the end of the decade.

Performing 12m PD Projections

Legend: NHG Baseline, Non-NHG Baseline, NHG Stress, Non-NHG Stress
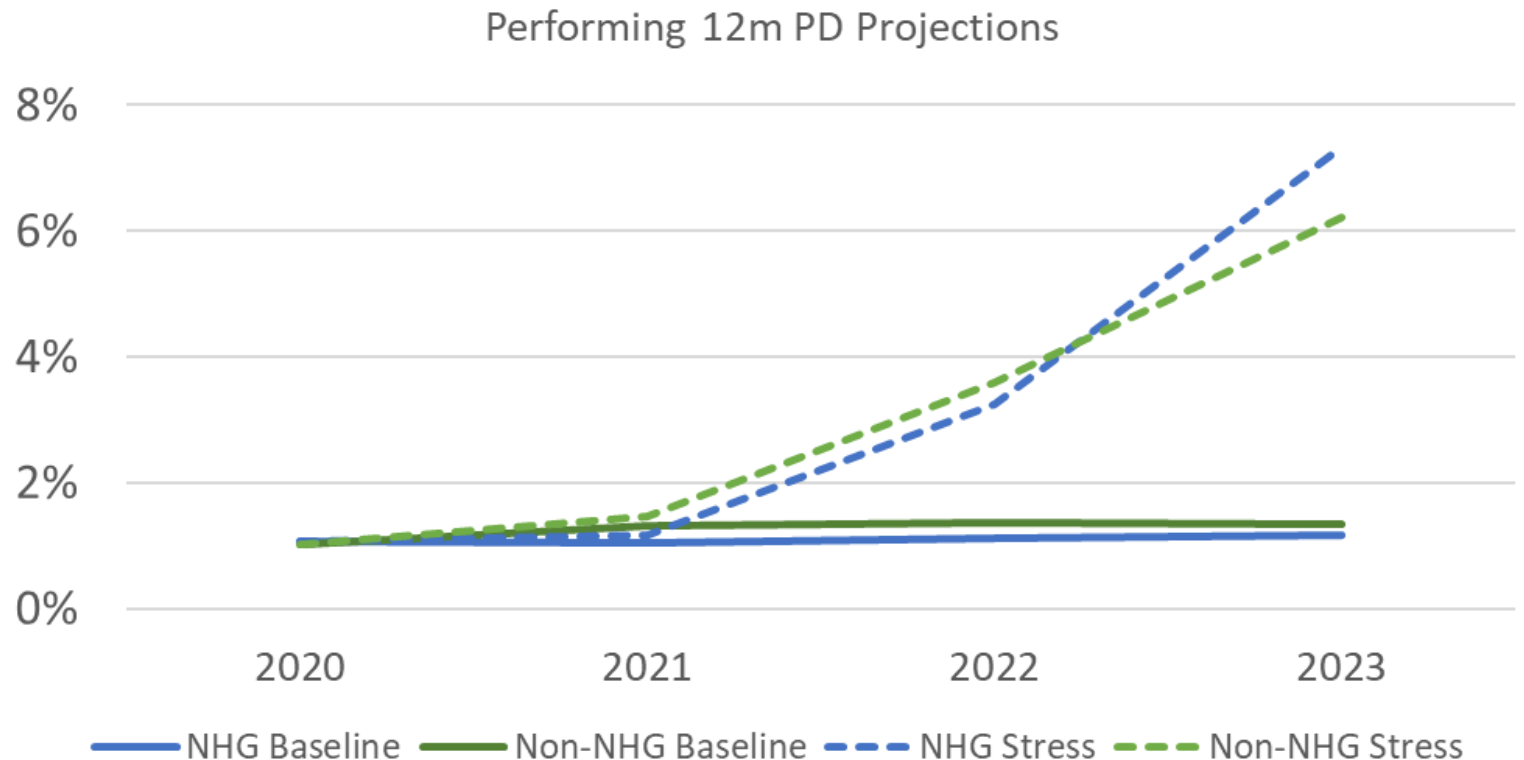
Data with Projections - LGD Distribution

Including 2023 projections

» The distribution of LGDs in December 2020 is displayed as the blue series.

» Under a Baseline scenario, the distribution (green) is projected to shift into lower LGD bands

» Under the EBA's stress scenario, the distribution (orange) is projection to shift into higher LGD bands.

LGD Distribution

Simulations – Distribution of Expected Losses

3Y Expected Loss – VaR Approach

Distribution of 3Y Expected Loss

Baseline ■ Stress
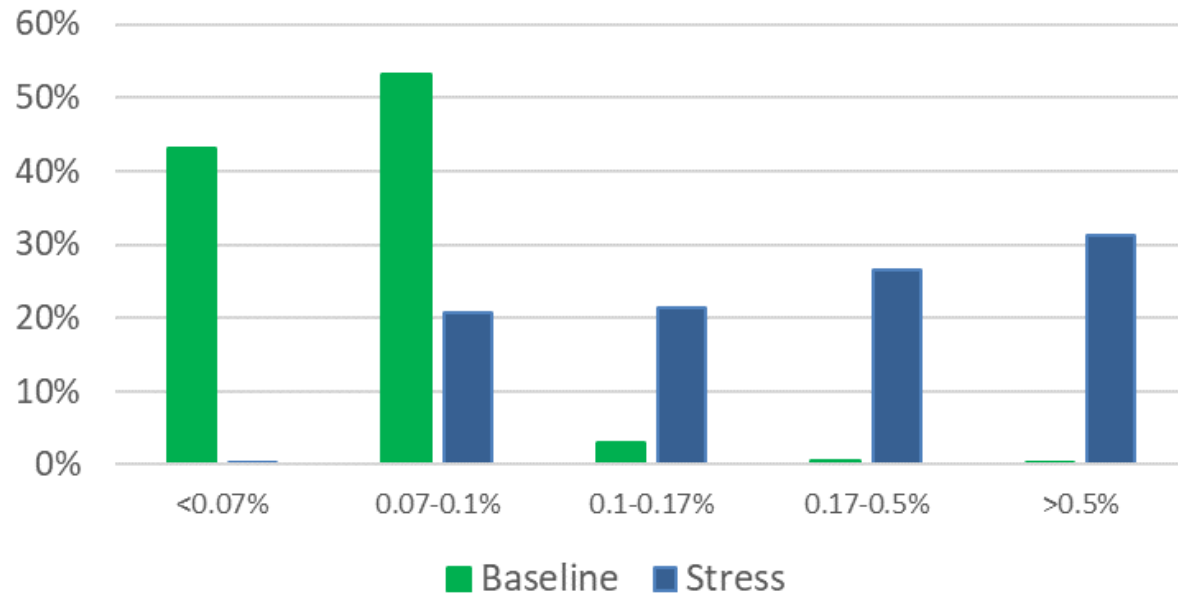
Dutch MPA – EBA Baseline		Dutch MPA – EBA Adverse	
Loss Summary Baseline		**Loss Summary Adverse**	
Expected Loss	0.0743	Expected Loss	1.2597
Aggregate Statistics Baseline		**Aggregate Statistics Adverse**	
Simulations	10,000	Simulations	10,000
Mean	0.0743	Mean	1.2597
SD	0.0223	SD	3.1804
IQR	0.0117	IQR	0.6340
Skewness	10.9183	Skewness	4.8416
Kurtosis	190.21	Kurtosis	28.1211
95th/50th Pct	1.3642	95th/50th Pct	29.1676
Value-at-Risk Baseline		**Value-at-Risk Adverse**	
50%	0.0704	50%	0.2205
75%	0.0771	75%	0.7457
90%	0.0863	90%	2.9703
95%	0.0961	95%	6.4302

4 | Forecasting EBA Risk Parameters

Impairment Forecasting Inputs
Account-Level Projections

Segmentation	IFRS 9/Stress-Testing Methodology
» Segmentation classes are the basis for initial scenario-conditional parameter calculations: Mortgages	» Methodology that links risk parameters to macro drivers Scenario-conditional PDs are calculated for PD classes.
Historical Transition Matrices	**Stage allocation**
» Recent history used to derive stressed TR matrices	» Quantitative and qualitative transfer criteria between stages.

Forecasting Impairments
Key Steps

» Obtain a through-the-cycle transition matrix

» Construct a point-in-time transition matrix conditional on economic drivers using the Z-factor shift approach

» Estimate Starting Parameters

» Forecast the staging distribution

» Forecast the delinquency status distribution

» Calculate lifetime expected loss rates

Stage Allocation
Dutch MPA

STEP 1 – Identification of NPLs
Is the account in default?

YES → **Stage 3**

NO → **STEP 2 – Qualitative threshold criteria**
Is the account equal to or more than 30DPD?

YES → **Stage 2**

NO → **STEP 3**
Does the account meet the quantitative threshold criteria for stage 2 allocation?

YES → **Stage 2**

NO → **Stage 1**

{[(Above Threshold) OR
(Relative increase in LTPD >200%)]
AND
[Absolute 12m PD>=0.30%]}

OR

{12mPD>20%}
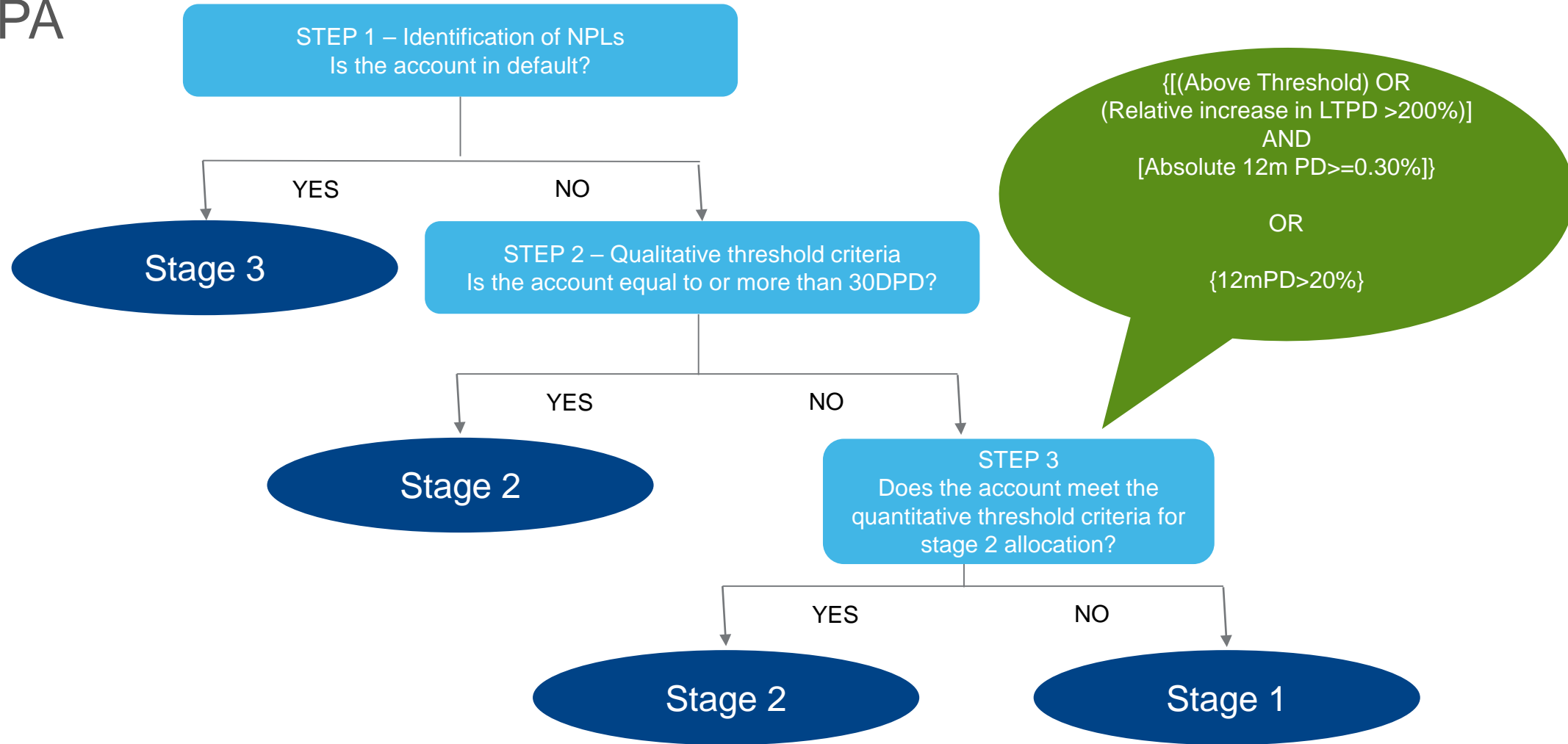
Conditional Transition Matrix
Constructing a PiT Transition Matrix – Starting Parameters

TTC TR

	Stage 1	Stage 2	Stage 3
Stage 1	99.08%	0.75%	0.17%
Stage 2	28.82	68.72	2.36
Stage 3	0%	0%	100.00%

Conditional PD

PD
0.05%
5.59
NA

Shift Probabilities

| Stage 3 | Stage 2 | Stage 1 |

PiT TR

	Stage 1	Stage 2	Stage 3
Stage 1	99.72 %	0.23%	0.05%
Stage 2	19.37	75.04	5.59
Stage 3	0%	0%	100%

» Historical data summarized into through-the-cycle transition matrix
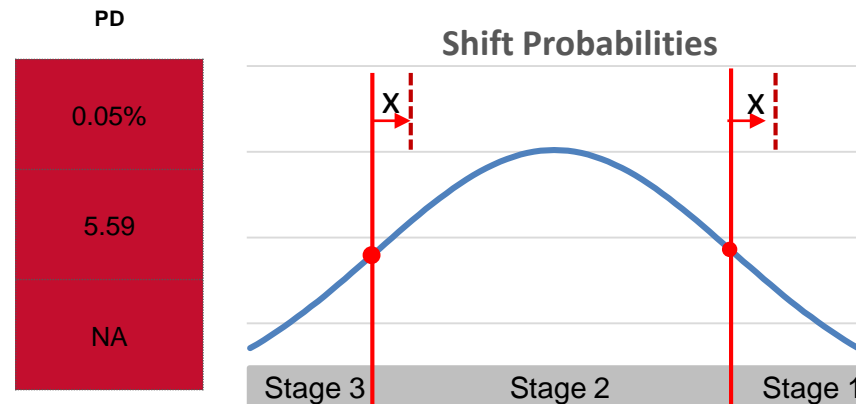
» PDs are implied by the IFRS 9/Stress testing methodology

» Transition probabilities are assumed to make a parallel shift in inverse normal distribution space: Z-factor approach

» Transition matrix conditional on a stress scenario

» Determines EBA risk parameters TR1-2 and TR1-3

Parameter Projections
NHG

Starting Point Parameters	
TR 1-3	0.05%
TR 1-2	0.23%
TR 2-1	19.37%
TR 2-3	5.59%
LGD 1-3	4.53%
LGD 2-3	5.37%
Cure 1-3	0.00%
Cure 2-3	0.00%
LRLT 1-2	0.08%
LRLT 2-2	0.45%
LRLT 3-3	3.66%

	2021	2022	2023
EBA - Baseline Parameters			
TR 1-3	0.056%	0.056%	0.055%
TR 1-2	0.235%	0.236%	0.233%
TR 2-1	22.334%	20.606%	19.710%
TR 2-3	4.517%	5.109%	5.452%
LGD 1-3	3.055%	2.268%	1.112%
LGD 2-3	6.347%	3.165%	3.448%
Cure 1-3	0.000%	0.000%	0.000%
Cure 2-3	0.000%	0.000%	0.000%
LRLT 1-2	0.064%	0.060%	0.047%
LRLT 2-2	0.358%	0.320%	0.253%
LRLT 3-3	4.743%	3.955%	3.192%
EBA - Baseline Benchmark			
TR 1-3	4.900%	5.300%	4.100%
TR 1-2	5.000%	5.100%	4.700%
TR 2-1	20.100%	19.700%	21.300%
TR 2-3	9.800%	10.400%	8.400%
LGD 1-3	32.958%	32.958%	32.958%
LGD 2-3	39.782%	39.782%	39.782%
Cure 1-3	NA	NA	NA
Cure 2-3	NA	NA	NA
LRLT 1-2	8.300%	6.500%	5.200%
LRLT 2-2	10.000%	7.900%	6.200%
LRLT 3-3	NA	NA	NA

	2021	2022	2023
EBA - Adverse Parameters			
TR 1-3	0.06%	0.17%	0.33%
TR 1-2	0.26%	0.60%	1.02%
TR 2-1	21.13%	9.41%	3.92%
TR 2-3	4.92%	12.74%	24.37%
LGD 1-3	4.71%	3.87%	4.50%
LGD 2-3	6.31%	5.81%	4.31%
Cure 1-3	0.00%	0.00%	0.00%
Cure 2-3	0.00%	0.00%	0.00%
LRLT 1-2	0.86%	1.20%	1.73%
LRLT 2-2	0.81%	1.12%	1.24%
LRLT 3-3	4.74%	5.53%	5.05%
EBA - Adverse Benchmark			
TR 1-3	5.80%	10.30%	7.20%
TR 1-2	5.30%	6.40%	5.60%
TR 2-1	19.00%	15.50%	17.80%
TR 2-3	11.40%	18.40%	13.60%
LGD 1-3	45.56%	45.56%	45.56%
LGD 2-3	52.99%	52.99%	52.99%
Cure 1-3	NA	NA	NA
Cure 2-3	NA	NA	NA
LRLT 1-2	17.80%	13.40%	10.00%
LRLT 2-2	20.80%	15.60%	11.70%
LRLT 3-3	NA	NA	NA

5 | Capital Implications

Capital Overview

Introduction

» Moody's Analytics provide IFRS9 impairment modelling solutions to a range of institutions, with models provided in Moody's Portfolio Analyzer (MPA).

» Standardised, foundation or advanced IRB capital calculations under current and future Basel accords can also be provided, dependant on the specifications provided by the institution.

» There are many benefits of calculating capital alongside impairment:

1. Capital analysis would provide insight into the portfolio using a default template with graphs that could be customised

2. Providing impairment and capital calculations in the same place allows for clients to understand if there are tranches where they are underproviding for expected losses

3. Predict future capital requirements under alternative macroeconomic conditions for…

   a) Stress testing a range of scenarios

   b) Population of regulatory templates (i.e. EBA stress test)

   c) Reverse stress testing

REA Impact Assessment
Standardized Approach

Main Drivers of Stressed REA

Higher LLPs imply lower net exposures, thus, lower REA

LLPs

NPLs

Higher NPLs imply more exposures that are risk weighted at 100% / 150%

Higher NPL coverage (>=20%), more exposures weighted at 100% vs 150%

NPL coverage

Property price shock
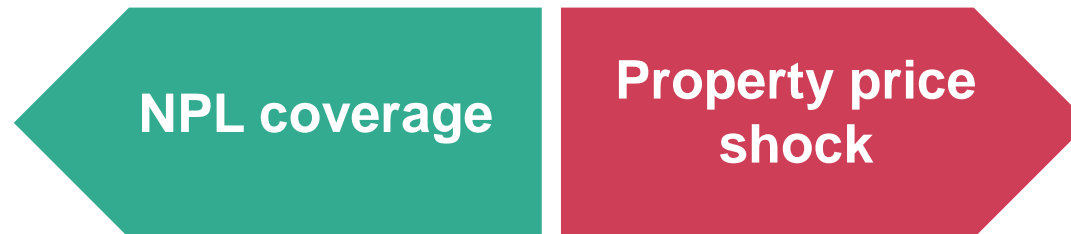
Decline in property prices reduces exposure subject to 35% risk weight

Risk Weight Projections

Summary – Dutch representative data example (using standardized RW calculations)

Scenario	Period	Accounts	Exposure	Provision	RWA	RW	RW Absolute Increase over Baseline
Baseline	Dec-20	818,653	€ 71,891,011,230	€ 22,017,425	€ 26,201,115,588	36.4%	
	Dec-21	818,653	€ 71,891,011,230	€ 45,541,098	€ 25,442,996,895	35.4%	
	Dec-22	818,653	€ 71,891,011,230	€ 52,579,525	€ 25,638,747,005	35.7%	
	Dec-23	818,653	€ 71,891,011,230	€ 58,660,632	€ 25,715,428,454	35.8%	
Stress	Dec-20	818,653	€ 71,891,011,230	€ 22,017,425	€ 26,201,115,588	36.4%	0.0%
	Dec-21	818,653	€ 71,891,011,230	€ 59,307,030	€ 26,392,259,688	36.7%	1.3%
	Dec-22	818,653	€ 71,891,011,230	€ 119,857,220	€ 29,593,665,081	41.2%	5.5%
	Dec-23	818,653	€ 71,891,011,230	€ 205,944,859	€ 32,032,194,947	44.6%	8.8%

Expected v Unexpected Losses

ECL & RWA
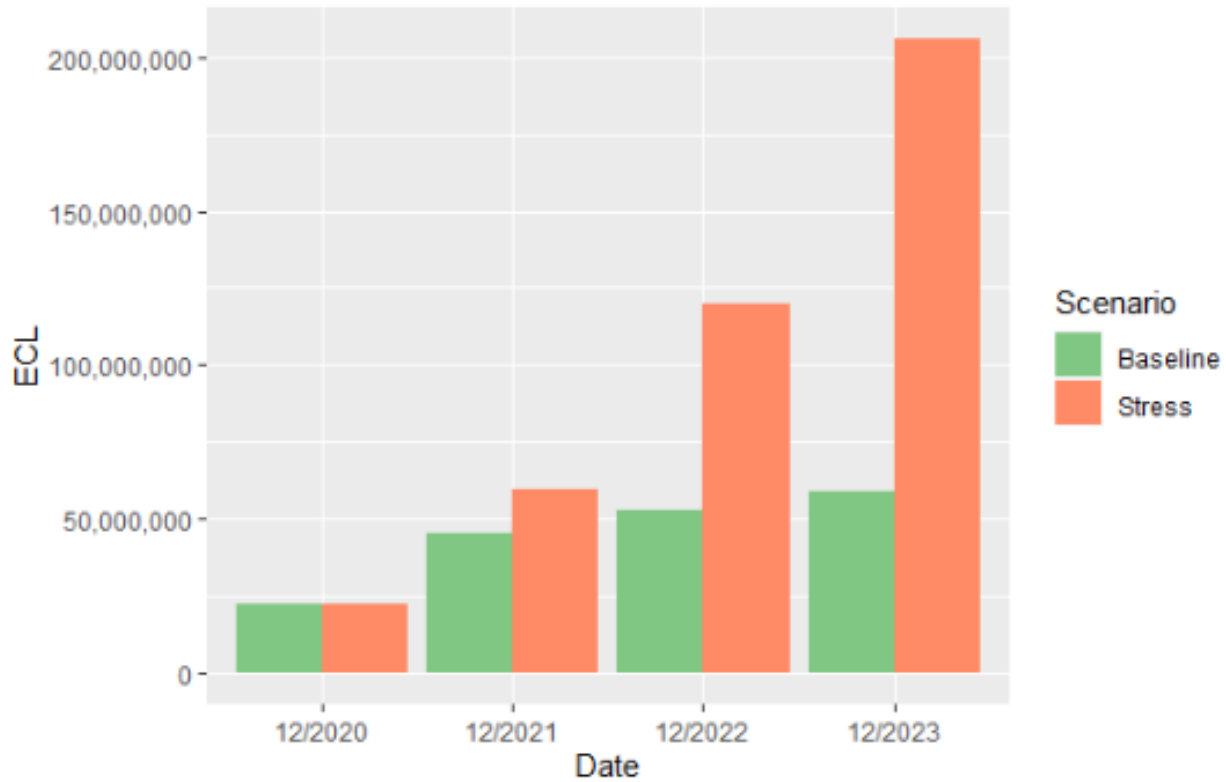
Expected v Unexpected Losses cont.

Forecasted Losses by IFRS9 Stage
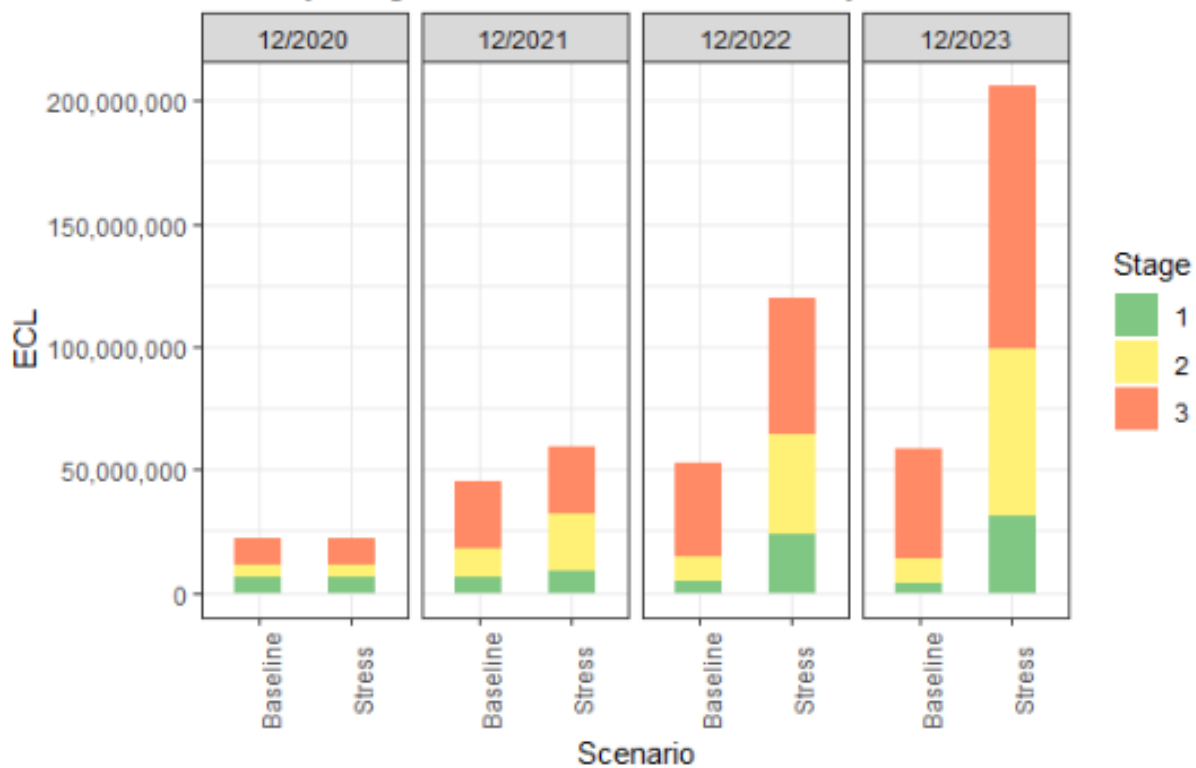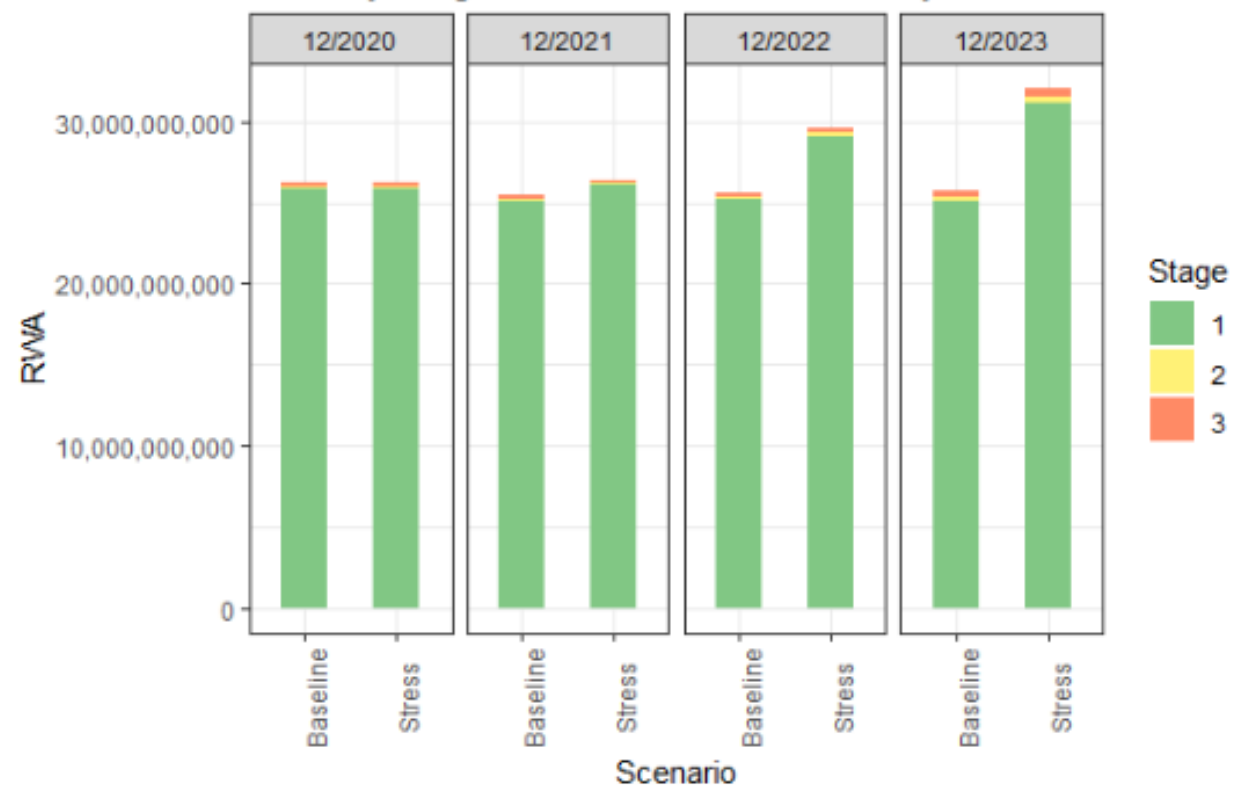
Forecasted Arrears

Arrears by Delinquency Status and NHG Indicator
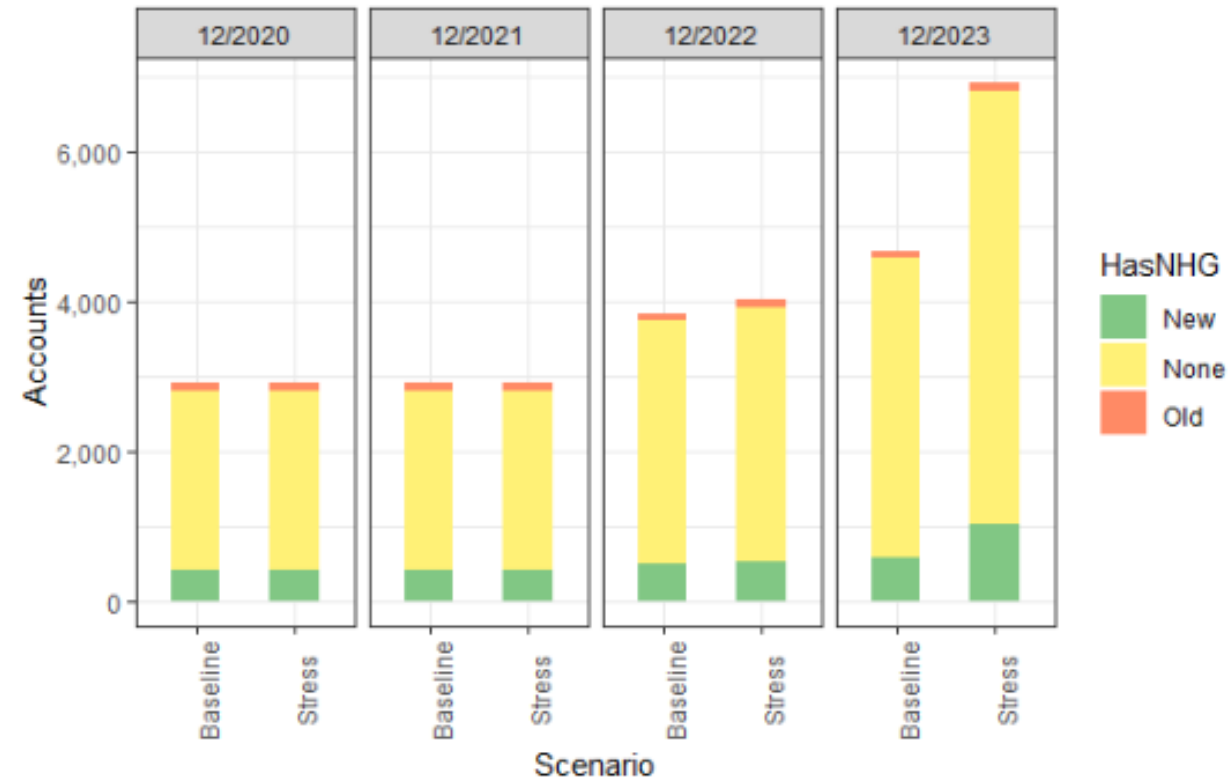
Key Takeaways

1. The Dutch economy will need several years to recover from the pandemic, with the stressed scenario lasting towards a decade.

2. NHG Mortgages have greater LTV but still mostly assigned IFRS 9 Stage 1.

3. 12m PDs and 3yr conditional expected losses rise in the EBA stress scenarios.

4. Default risk increases in the EBA stress scenario but losses are contained for NHG mortgages.

5. While ECL rises under stress, the unexpected losses are similar across scenarios, resulting in a relatively smaller capital adjustment.

Q&A

Additional questions? Email us at help@economy.com

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