EUROPEAN
DATAWAREHOUSE

RESEARCH UPDATE

Q2 2025

JUNE 2025

WELCOMING REMARKS

ON TODAY'S CALL

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AGENDA

WELCOMING REMARKS
DR. CHRISTIAN THUN, EUROPEAN DATAWAREHOUSE

LATEST PUBLICATIONS AND PROJECTS
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

FAQ UPDATE (DATA AVAILABILITY, SME INDICES, DATA OVERLAPS, LOAN ID CONSISTENCY, CALCULATION OF PREPAYMENTS...)
LUDOVIC THEBAULT, USMAN JAMIL, EUROPEAN DATAWAREHOUSE

FROM FLOOD TO FIRE: IS PHYSICAL CLIMATE RISK TAKEN INTO ACCOUNT IN BANKS' RESIDENTIAL MORTGAGE RATES?
ADELE FONTANA & BENEDIKT SCHEID, EUROPEAN CENTRAL BANK

Q&A
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

UPCOMING EVENTS: H2 2025

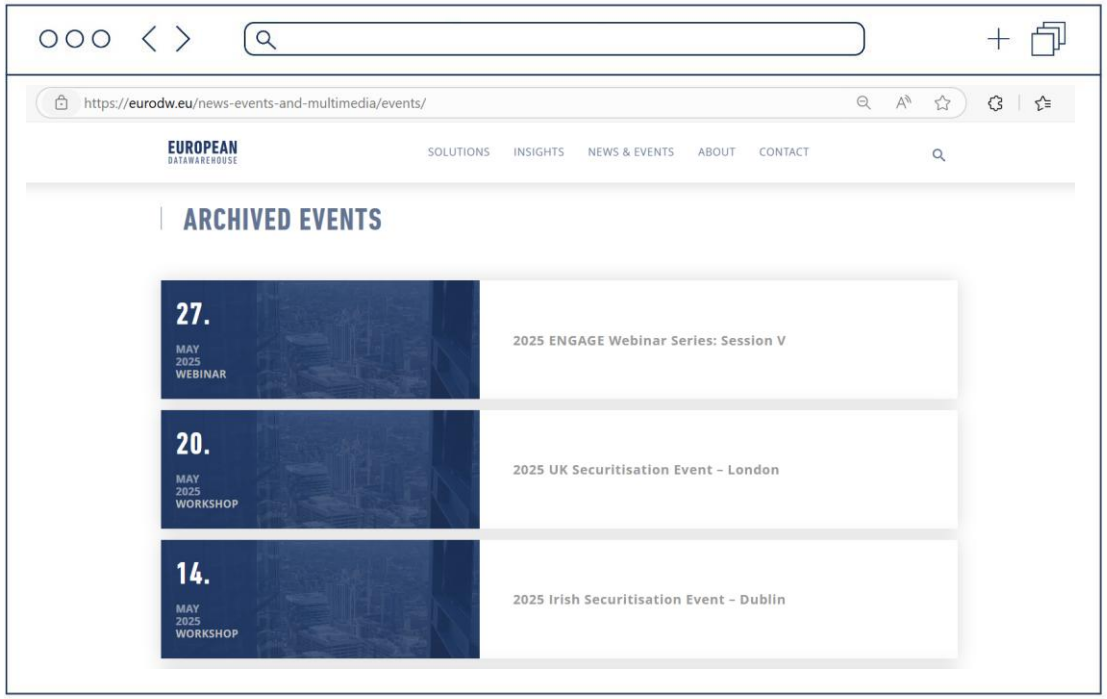
CHECK OUR WEBSITE – MORE 2025 EVENTS TO BE ANNOUNCED!

Date	EDW Hosted Event
27 June	Regulatory Roundtable Webinar
23 September	Q3 Research Update Webinar
23 October	EDW Autumn Virtual Update
28 October	2025 Dutch Securitisation Event - Amsterdam
4 November	2025 Spanish Securitisation Event - Madrid
20 November	2025 German Securitisation Event - Frankfurt
20 November	Driving the Future: 2025 European Green Auto Securitisation Workshop
16 December	Q4 Research Update Webinar

LATEST PUBLICATIONS AND PROJECTS

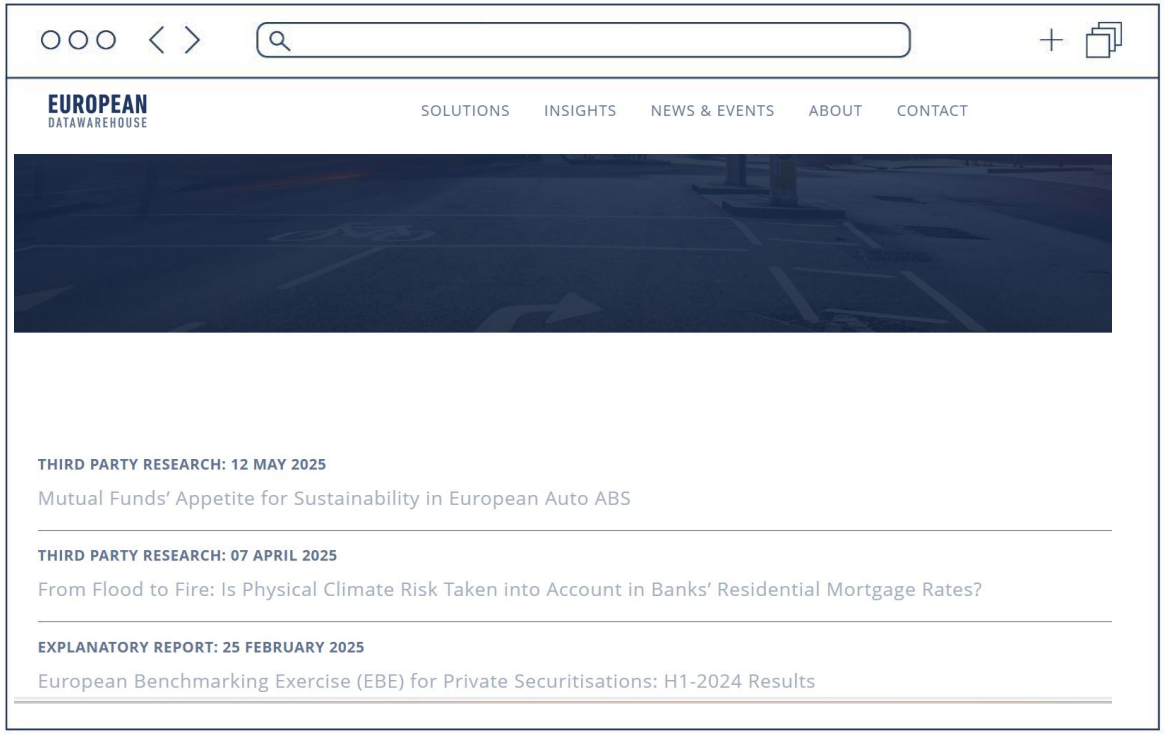
ARCHIVED EVENTS

RECORDINGS AND SLIDES OF PAST WEBINARS: HTTPS://EURODW.EU/NEWS-EVENTS-AND-MULTIMEDIA/EVENTS/



EDW RESEARCH SECTION

OUR OWN PUBLICATIONS PLUS THIRD-PARTY RESEARCH: HTTPS://EURODW.EU/KNOWLEDGE/RESEARCH/

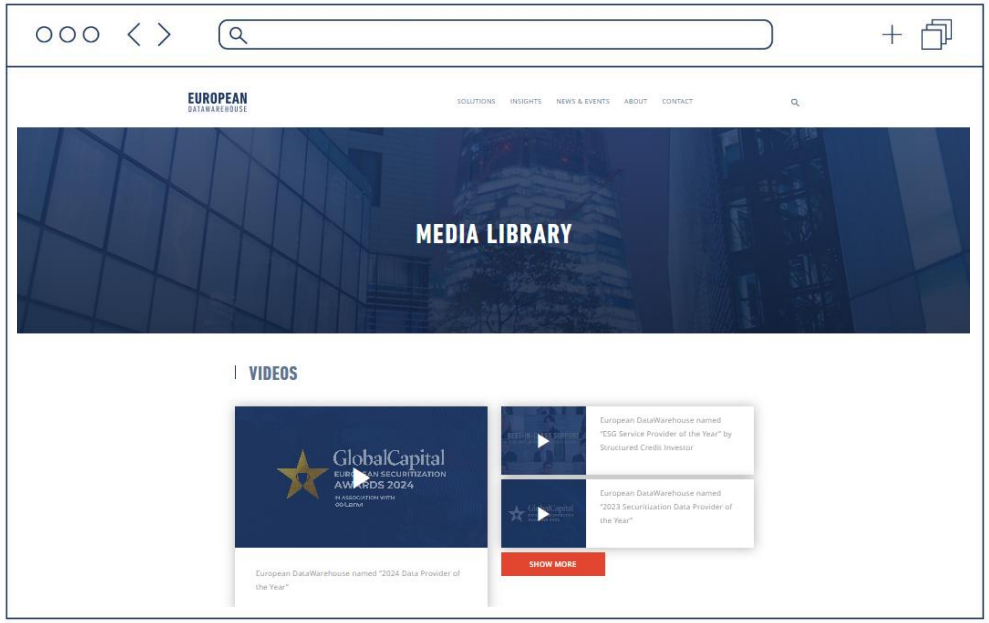


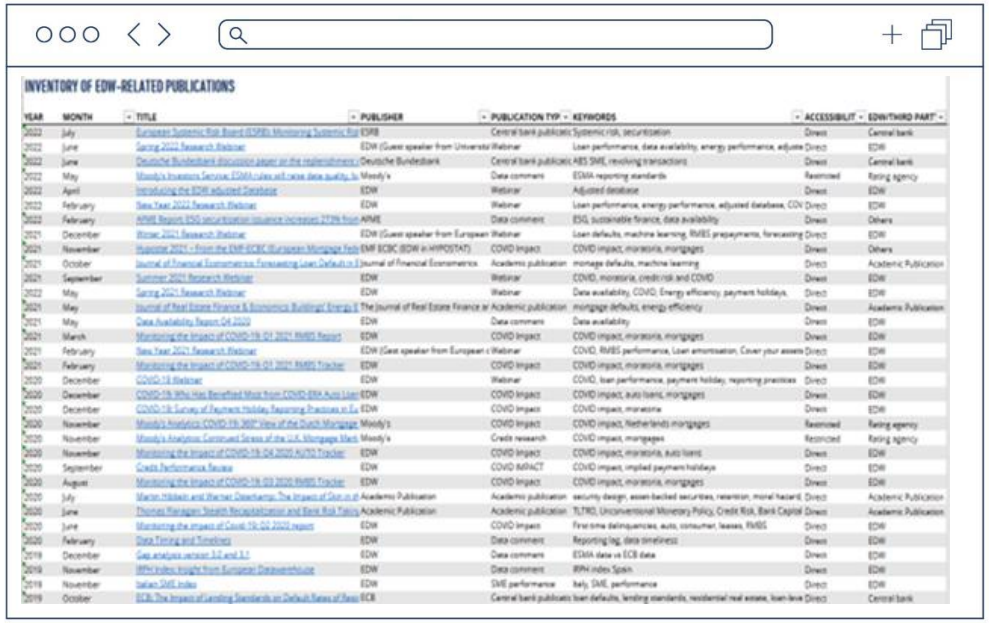
Latest publications:

- *Mutual Funds' Appetite for Sustainability in European Auto ABS* (GAS project)
- *From flood to fire: is physical climate risk taken into account in banks' residential mortgage rates?* (ECB)
- *European Benchmarking Exercise (EBE) for Private Securitisations*

LIST OF RESEARCH PUBLICATIONS

OUR OWN PUBLICATIONS PLUS THIRD-PARTY RESEARCH: MEDIA LIBRARY - EUROPEAN DATAWAREHOUSE (EURODW.EU)





INVENTORY OF EDW-RELATED PUBLICATIONS

YEAR	MONTH	TITLE	PUBLISHER	PUBLICATION TYP	KEYWORDS	ACCESSIBILIT	EDW/THIRD PART
2022	July	European Systemic Risk Board (ESRB) Monitoring Systemic Ris	ESRB	Central bank publicati	Systemic risk, securitisation	Direct	Central bank
2022	June	Spring 2022 Research Webinar	EDW (Guest speaker from Universit	Webinar	Loan performance, data availability, energy performance, adjuste	Direct	EDW
2022	June	Deutsche Bundesbank discussion paper on the implementing	Deutsche Bundesbank	Central bank publicati	ABS SME, revolving transactions	Direct	Central bank
2022	May	Moody's Investors Service: ESMA rules will raise data quality, b	Moody's	Data comment	ESMA reporting standards	Restricted	Rating agency
2022	April	Introducing the EDW adjusted Database	EDW	Webinar	Adjusted database	Direct	EDW
2022	February	New Year 2022 Research Webinar	EDW	Webinar	Loan performance, energy performance, adjusted database, CDV	Direct	EDW
2022	February	APME Report ESG securitisation issuance increases 277% from	APME	Data comment	ESG, sustainable finance, data availability	Direct	Others
2021	December	Winter 2021 Research Webinar	EDW (Guest speaker from European	Webinar	Loan defaults, machine learning, RMBS prepayments, forecasting	Direct	EDW
2021	November	Hypostat 2021 - from the EMF-ECBC (European Mortgage Feder	EMF ECBC (EDW in HYPOSTAT)	COVID Impact	COVID impact, moratoria, mortgages	Direct	Others
2021	October	Journal of Financial Econometrics: Forecasting Loan Default in	Journal of Financial Econometrics	Academic publication	mortage defaults, machine learning	Direct	Academic Publication
2021	September	Summer 2021 Research Webinar	EDW	Webinar	COVID, moratoria, credit risk and COVID	Direct	EDW
2022	May	Spring 2021 Research Webinar	EDW	Webinar	Data availability, COVID, Energy efficiency, payment holidays,	Direct	EDW
2021	May	Journal of Real Estate Finance & Economics Buildings' Energy E	The Journal of Real Estate Finance a	Academic publication	mortgage defaults, energy efficiency	Direct	Academic Publication
2021	May	Data Availability Report Q4 2020	EDW	Data comment	Data availability	Direct	EDW
2021	March	Monitoring the Impact of COVID-19 Q1 2021 RMBS Report	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2021	February	New Year 2021 Research Webinar	EDW (Guest speaker from European c	Webinar	COVID, RMBS performance, Loan amortisation, Cover your assets	Direct	EDW
2021	February	Monitoring the Impact of COVID-19 Q1 2021 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2020	December	COVID-19 Webinar	EDW	Webinar	COVID, loan performance, payment holiday, reporting practices	Direct	EDW
2020	December	COVID-19: Who Has Benefited Most from COVID-ERA Auto Loan	EDW	COVID Impact	COVID impact, auto loans, mortgages	Direct	EDW
2020	December	COVID-19: Survey of Payment Holiday Reporting Practices in Eu	EDW	COVID Impact	COVID impact, moratoria	Direct	EDW
2020	November	Moody's Analytics: COVID-19: 360° View of the Dutch Mortgage	Moody's	COVID Impact	COVID impact, Netherlands mortgages	Restricted	Rating agency
2020	November	Moody's Analytics: Continued Stress of the U.S. Mortgage Mark	Moody's	Credit research	COVID impact, mortgages	Restricted	Rating agency
2020	November	Monitoring the Impact of COVID-19: Q4 2020 AUTO Tracker	EDW	COVID Impact	COVID impact, moratoria, auto loans	Direct	EDW
2020	September	Credit Performance Review	EDW	COVID IMPACT	COVID impact, implied payment holidays	Direct	EDW
2020	August	Monitoring the Impact of COVID-19: Q3 2020 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2020	July	Martin Hüttwell and Werner Doerkamp: The Impact of Gov in ot	Academic Publication	Academic publication	security design, asset-backed securities, retention, moral hazard,	Direct	Academic Publication
2020	June	Thomas Mariagger: Stealth Recapitalisation and Bank Risk Policy	Academic Publication	Academic publication	TLTRO, Unconventional Monetary Policy, Credit Risk, Bank Capital	Direct	Academic Publication
2020	June	Monitoring the impact of Covid-19: Q2 2020 report	EDW	COVID Impact	First time delinquencies, auto, consumer, leases, RMBS	Direct	EDW
2020	February	Data Timing and Timeliness	EDW	Data comment	Reporting lag, data timeliness	Direct	EDW
2019	December	Gap analysis version 3.2 and 3.1	EDW	Data comment	ESMA data vs ECB data	Direct	EDW
2019	November	IRPH index: Insight from European Datawarehouse	EDW	Data comment	IRPH index Spain	Direct	EDW
2019	November	Italian SME index	EDW	SME performance	Italy, SME, performance	Direct	EDW
2019	October	ECB: The Impact of Lending Standards on Default Rates of Resi	ECB	Central bank publicati	loan defaults, lending standards, residential real estate, loan-leve	Direct	Central bank

LIST OF RESEARCH PUBLICATIONS

INVENTORY OF EDW-RELATED PUBLICATIONS

YEAR	MONTH	TITLE	PUBLISHER	PUBLICATION T	KEYWORDS	ACCESSIBI
2023	April	Understanding EDW's Loan Identifier Reoccurrence Score	EDW	Special Report	Loan ID Reoccurrence, Borrower ID Consistency, Data Quality	Direct
2023	January	European Auto ABS: Have Delinquencies Hit Rock Bottom?	DBRS	Credit research	European auto asset-backed securities (ABS)	Direct
2023	January	Impact of Rising Rates on UK Mortgages	DBRS	Credit research	UK Mortgages	Direct
2022	October	Navigating the housing channel of monetary policy across euro area regions	European Central Bank (ECB)	Credit research	housing market, business cycles, regional inequality	Direct
2022	October	European Benchmarking Exercise (EBE) for Private Securitisations	AFME/EDW/TSI	EBE	Private securitisation market	Direct
2022	October	Swiss Finance Institute: Do Lenders Price the Brown Factor in Car Loans?	Swiss Finance Institute	Academic publication	loan level data, Diesel vehicles	Direct
2022	september	DBRS Morningstar Commentary on European Auto ABS: German Portfolios Transition to Alternatively Fuelled Vehicles	DBRS	Credit research	European Auto ABS	Restricted
2022	August	Matteo Benetton, Sergio Mayordomo, Daniel Paravisini: Credit Fire Sales: Captive Lending as Liquidity in Distress	Academic publication	Academic publication	Captive Finance, Fire Sales, Vertical Integration, Liquidity	Direct
2022	July	European Systemic Risk Board (ESRB): Monitoring Systemic Risks in the EU Securitisation Market	ESRB	Central bank publicatic	Systemic risk, securitisation	Direct
2022	June	Spring 2022 Research Webinar	EDW (Guest speaker from Universitat	Webinar	Loan performance, data availability, energy performance, adjuste	Direct
2022	June	Deutsche Bundesbank discussion paper on the replenishment of ABS backed by SME loans	Deutsche Bundesbank	Central bank publicatic	ABS SME, revolving transactions	Direct
2022	May	Moody's Investors Service: ESMA rules will raise data quality, but additional fields would aid credit analysis (originally published 7 May 2020)	Moody's	Data comment	ESMA reporting standards	Restricted
2022	April	Introducing the EDW adjusted Database	EDW	Webinar	Adjusted database	Direct
2022	February	New Year 2022 Research Webinar	EDW	Webinar	Loan performance, energy performance, adjusted database, CO	Direct
2022	February	AFME Report: ESG securitisation issuance increases 273% from 2020 to 2021	AFME	Data comment	ESG, sustainable finance, data availability	Direct
2021	December	Winter 2021 Research Webinar	EDW (Guest speaker from European	Webinar	Loan defaults, machine learning, RMBS prepayments, forecasting	Direct
2021	November	Hipotrat 2021 - From the EMF-ECBC (European Mortgage Federation - European Covered Bond Council)	EMF ECBC (EDW in HYPOSTAT)	COVID Impact	COVID impact, moratoria, mortgages	Direct
2021	October	Journal of Financial Econometrics: Forecasting Loan Default in Europe with Machine Learning	Journal of Financial Econometrics	Academic publication	mortage defaults, machine learning	Direct
2021	September	Summer 2021 Research Webinar	EDW	Webinar	COVID, moratoria, credit risk and COVID	Direct
2022	May	Spring 2021 Research Webinar	EDW	Webinar	Data availability, COVID, Energy efficiency, payment holidays,	Direct
2021	May	Journal of Real Estate Finance & Economics: Buildings' Energy Efficiency & the Probability of Mortgage Default - The Dutch Case	The Journal of Real Estate Finance a	Academic publication	mortgage defaults, energy efficiency	Direct
2021	May	Data Availability Report Q4 2020	EDW	Data comment	Data availability	Direct
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2020	December	COVID-19 Webinar	EDW	Webinar	COVID, loan performance, payment holiday, reporting practices	Direct
2020	December	COVID-19: Who Has Benefited Most from COVID-EBA Auto Loan Extensions?	EDW	COVID Impact	COVID impact, auto loans, mortgages	Direct
2020	December	COVID-19: Survey of Payment Holiday Reporting Practices in Europe	EDW	COVID Impact	COVID impact, moratoria	Direct
2020	November	Moody's Analytics: COVID-19: 360 View of the Dutch Mortgage Market	Moody's	COVID Impact	COVID impact, Netherlands mortgages	Restricted
2020	November	Moody's Analytics: Continued Stress of the U.K. Mortgage Market	Moody's	Credit research	COVID impact, mortgages	Restricted
2020	November	Monitoring the Impact of COVID-19: Q4 2020 AUTO Tracker	EDW	COVID Impact	COVID impact, moratoria, auto loans	Direct
2020	September	Household Debt and Economic Growth in Europe	SSRN	Academic publication	Household Debt, Great Recession, Economic Growth	Direct
2020	September	Credit Performance Review	EDW	COVID IMPACT	COVID impact, implied payment holidays	Direct
2020	August	Monitoring the Impact of COVID-19: Q3 2020 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct
2020	July	Martin Hibbeln and Werner Osterkamp: The Impact of Skin in the Game on Bank Behavior in the Securitization Market	Academic Publication	Academic publication	security design, asset-backed securities, retention, moral hazard,	Direct
2020	June	Thomas Flanagan: Stealth Recapitalization and Bank Risk Taking: Evidence from TLTROs	Academic Publication	Academic publication	TLTRO, Unconventional Monetary Policy, Credit Risk, Bank Capita	Direct
2020	June	Monitoring the impact of Covid-19: Q2 2020 report	EDW	COVID Impact	First time delinquencies, auto, consumer, leases, RMBS	Direct
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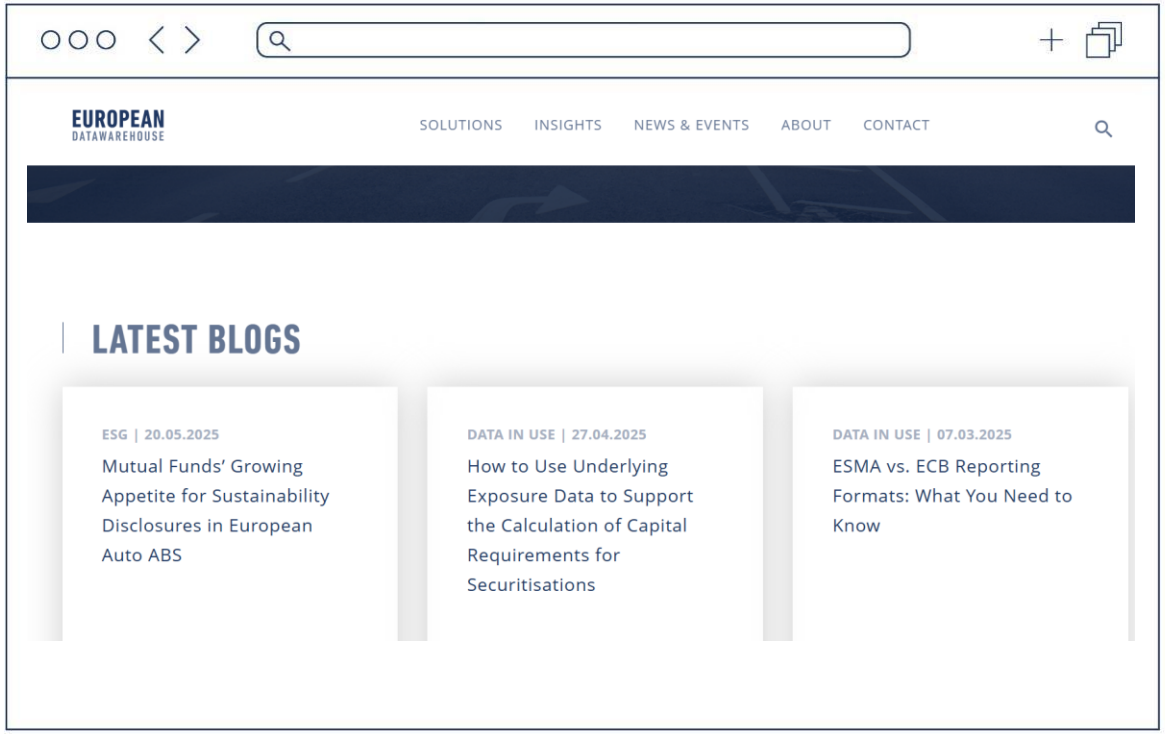
2019	October	ECB: The Impact of Lending Standards on Default Rates of Residential Real Estate Loans	ECB	Central bank publicatic	loan defaults, lending standards, residential real estate, loan-leve	Direct
2019	October	Bank of Spain: Beyond the LTV Ratio-New Macroprudential Lessons from Spain	Bank of Spain	Central bank publicatic	housing market, lending standards, defaults, macroprudential poli	Direct
2019	October	Framing Bias in Mortgage Refinancing Decisions and Monetary Policy Pass-Through	Academic Publication	Academic publication	reference points, mortgage refinancing, household finance, inter	Direct
2019	September	Data Availability Report I 2019 - Q1 (Excel)	EDW	Data comment	Data availability, ABS, SME, RMBS, Auto, Leases, Consumer	Direct

BLOG

SHORT ARTICLES ON CURRENT TOPICS: HTTPS://EURODW.EU/KNOWLEDGE/MAGAZINE//



Latest publications:

- Mutual funds' appetite for Sustainability In European Auto ABS (SAFE Working Paper - GAS project)
- How to use underlying exposure data to support the calculation of capital requirements for securitisations
- ECB vs ESMA reporting formats

ENVIRONMENT-RELATED TOPICS

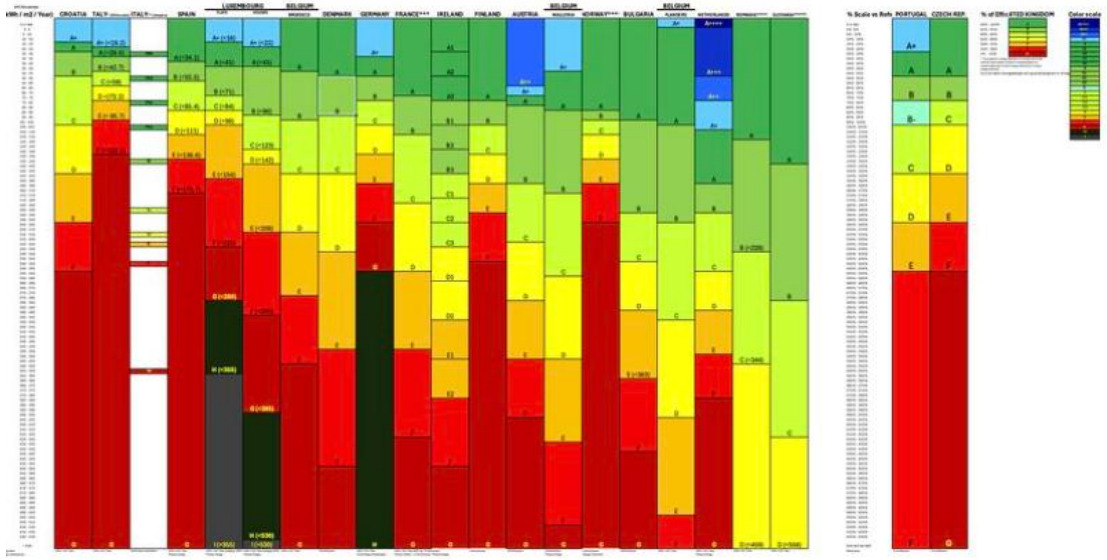
MANY RECENT PUBLICATIONS ARE ADDRESSING ENVIRONMENT-RELATED TOPICS

- How to green the European auto ABS market? A literature survey (C. Latino, L. Pelizzon, M. Riedel - SAFE)
- Is Energy Efficiency Credit Relevant? (L. Thebault, U. Jamil – EDW/HYPOSTAT)
- Re Investigating the Linkage between Buildings' Energy Efficiency and Mortgage Rates (L. Götz – EBS University)
- Financing the Global shift to Electric Mobility (J. Bena, B. Bian, H. Tang – University of British Columbia/Wharton School)
- The Effect of Wildfires on Mortgage Pricing : Evidence from Portugal (L. Götz, F. Mager, Joachim Zietz – EBS University)
- Climate Risk Measurement of Assets Eligible as Collateral for Refinancing Operations (Banque de France)
- Residential EPCs vs Credit Relevance (DBRS)
- RMBS: Not All EPCs Created Equal (DBRS)
- Do Lenders Price the Brown Factor in Car Loans? Evidence From Diesel Cars (W. Beyene, M. Falagiarda, S. Ongena – Uni. Zurich/ECB)

ENVIRONMENT-RELATED TOPICS

MANY RECENT PUBLICATIONS ARE ADDRESSING ENVIRONMENT-RELATED TOPICS

- European Auto ABS: German Portfolios Transition to Alternatively Fuelled Vehicles (DBRS)
- European Auto ABS ; Auto EPCs on a Diverging Road (DBRS)
- Revisiting the Babel Tower of EPC Ratings (EDW Blog)



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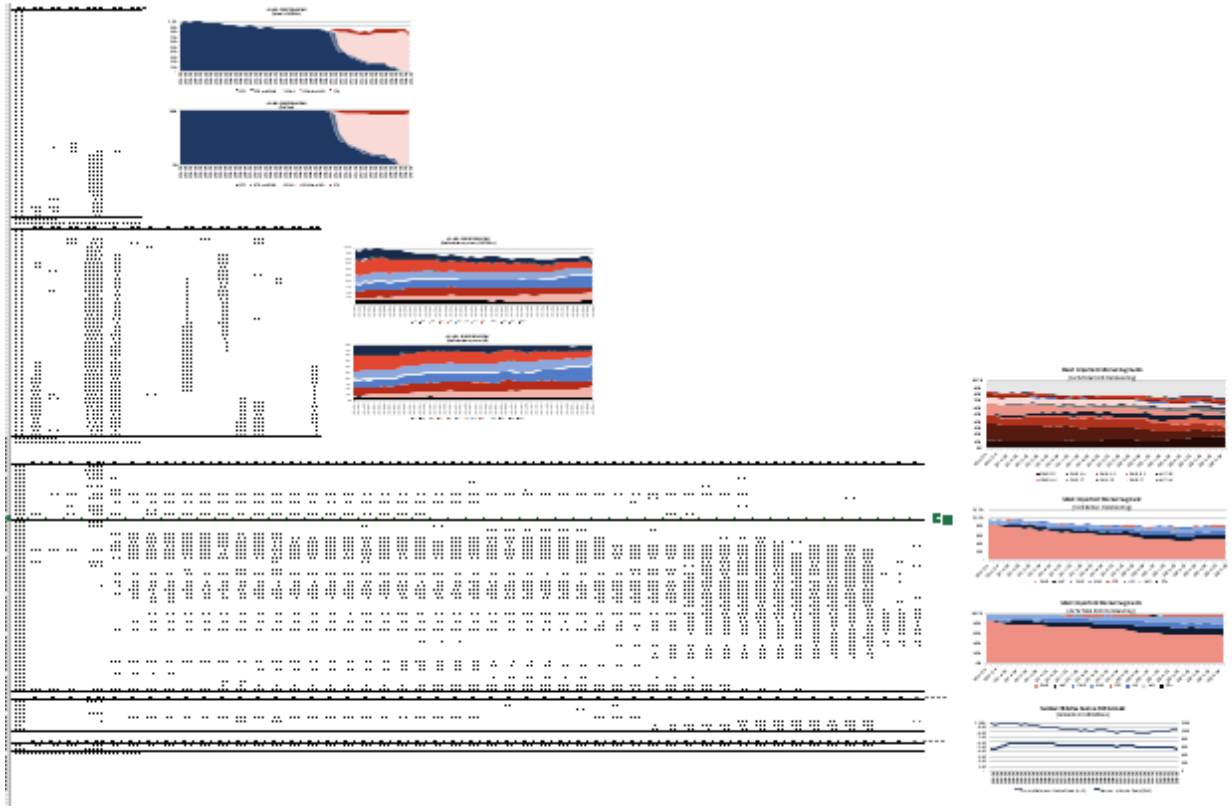
FAQ UPDATE

HOW DO WE MAKE THE DATA INVENTORY?

DATA INVENTORY AS OF Q4 2024

UPDATED PUBLIC SECURITISATION DATA INVENTORY IN EXCEL AVAILABLE ONLINE

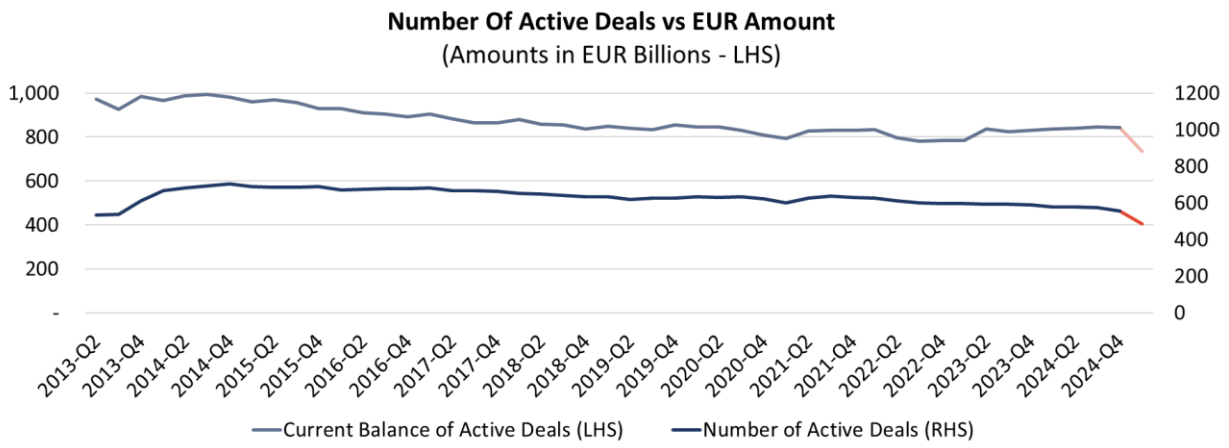


DATA INVENTORY AS OF Q4 2024

UPDATED PUBLIC SECURITISATION DATA INVENTORY IN EXCEL AVAILABLE ONLINE

Highlights:

- Data is only preliminary for 2025-Q1 (hence the dip for the 2025-Q1 data)
- Outstanding amount at EUR840 billion relatively stable since 2018
- The outstanding amount is rather stable, but the number of active deals is down at 555 vs 704 in 2014.
- There are some very large deals, as the top 10 deals account for 30% of the outstanding (BPCE Master Home loans = EUR 94 billion)



DATA INVENTORY

CHALLENGES TO CONSIDER WHEN MAKING A DATA INVENTORY

Data selection:

- For the various asset classes, EDW data is stored in ECB, ESMA, and FCA databases
- The FCA database is the UK database which uses the ESMA format
- Some deals report to both the ESMA database and the FCA database
- Some deals report monthly, others quarterly
- Avoiding double counting is a challenge when making a data inventory
    - Some data is reported both to ESMA and FCA
    - Some data reported both in the ECB and the ESMA database for some time
- Please note that the currency is not always the Euro (also GBP, PLN, SEK, NOK…)

Hence:

- Need to avoid double counting deals reported in several tables
- Need to avoid triple counting the deals reporting monthly
- Need to translate currencies and…
- Correction of errors (for historical data)

DATA INVENTORY

POINTS TO CONSIDER WHEN MAKING A DATA INVENTORY

Data selection:

- See the “deal” tables ([edcloud].[dbo].[deal] (i.e. ECB); [srdata].[STS].[Deals] (i.e. ESMA); [uksrdata].[STS].[Deals](i.e. FCA) to make a list of the referenced deals including secID, deal name and edcode,
    - Please note that a deal can be referenced both in the STS table and in the UK table under two different edcodes, although the secID should be the same and the deal name also
    - Also note the table the data is selected from (some mixed asset deals are reported partly in several tables)

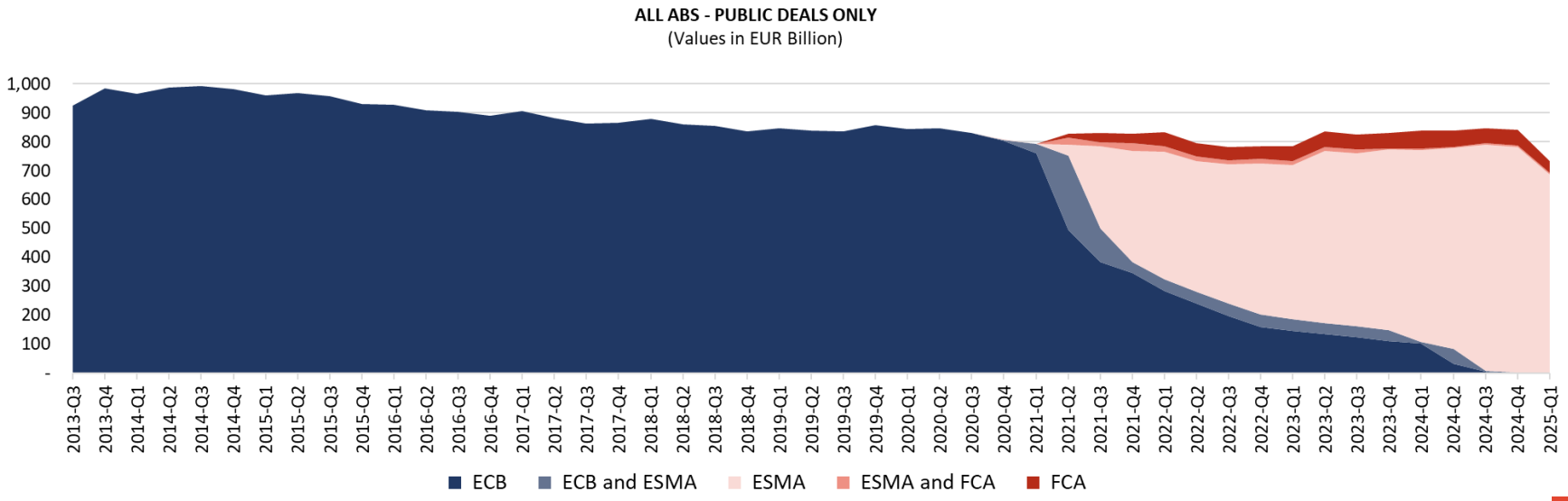
- We select in priority from the dbo (ECB format) table, then from the STS (ESMA table) and only from the UK table if the deal is not available in the other two
- The data of a deal is selected from one source only, arranged by date, only the latest entry of the quarter is selected to avoid triple counting the monthly submissions…
- For all the deals select edcode, secID, deal name, PCD (pool cut off date – as of date of the data), currency, count of assets where amount > 0, sum of assets, note the table it originates from.

DATA INVENTORY

THE NEW DATA INVENTORY REFERENCES ECB - ESMA DATA OVERLAPS

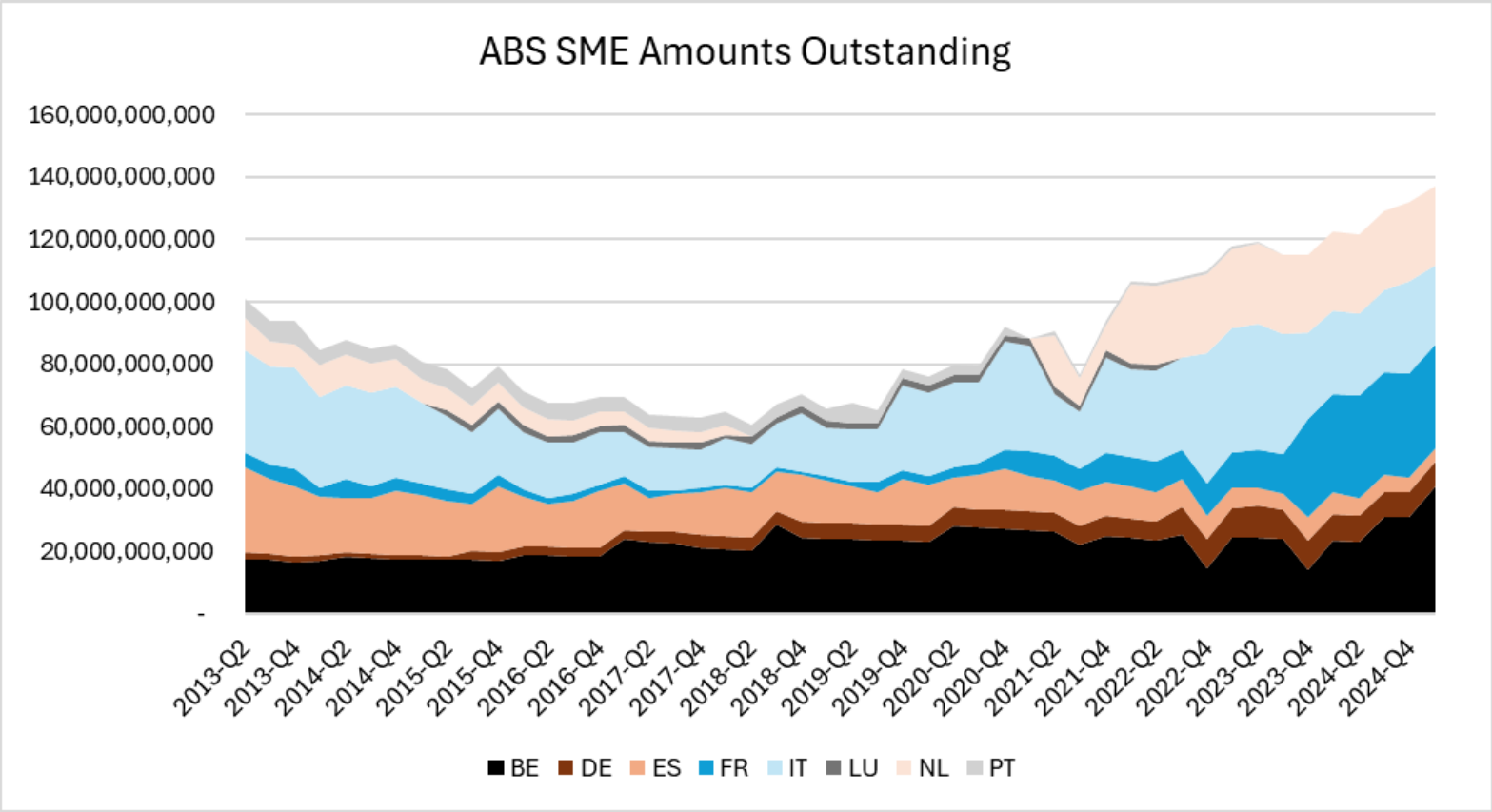
Data overlaps

- Some data was reported for a given period both in ECB and ESMA formats.
- Early ESMA uploads were more likely to include errors.
- For our overlaps list, we select the latest period at which both ECB and ESMA data was reported.



HOW DO WE CREATE AN SME PERFORMANCE INDEX?

PERFORMANCE INDICES – DATA AVAILABILITY



PERFORMANCE INDICES – WHAT TO LOOK FOR..

- First LLD submission has no Delinquencies!
- Certain buckets should only consider data after it has seasoned
  - e.g. 90-360 days delinquencies should only consider data that is seasoned for at least 1 year!
- Some deals might exclude some categories of non-performing loans
  - Exclude from index deals where arrears are always zero
- Multiple submissions in a period (some report monthly some quarterly)
- Concentration effects can be magnified due to unique reporting practices

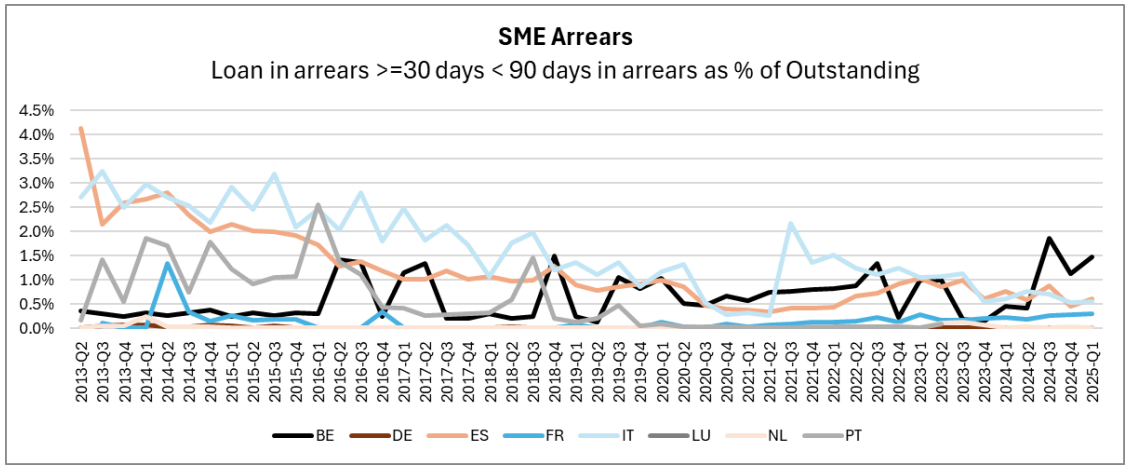
PERFORMANCE INDICES – RAW DATA SELECTION

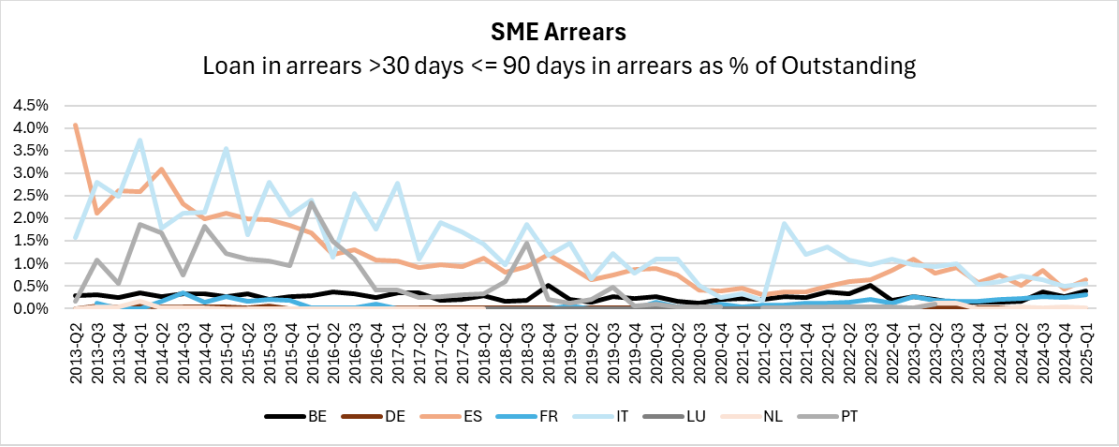
country	vintage	edcode	data_origi	Industry	pcd	QTR	Seasoning	Delinquency_	Balance	loans
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2012-12-31	2012-Q4	0	NULL	1,793,318,296	26675
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2012-12-31	2012-Q4	0	30 to 90	13,608,358	120
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2012-12-31	2012-Q4	0	360+	4,559,843	178
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2012-12-31	2012-Q4	0	90 to 360	8,403,943	177
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-03-31	2013-Q1	3	NULL	1,812,339,568	26722
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-03-31	2013-Q1	3	30 to 90	15,016,765	168
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-03-31	2013-Q1	3	360+	5,053,144	237
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-03-31	2013-Q1	3	90 to 360	9,521,639	154
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-06-30	2013-Q2	6	NULL	1,831,493,150	26781
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-06-30	2013-Q2	6	30 to 90	9,678,038	116
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-06-30	2013-Q2	6	360+	8,008,546	277
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-06-30	2013-Q2	6	90 to 360	10,878,549	153
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-09-30	2013-Q3	9	NULL	1,705,159,632	27698
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-09-30	2013-Q3	9	30 to 90	8,523,028	133
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-09-30	2013-Q3	9	360+	7,290,289	304
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-09-30	2013-Q3	9	90 to 360	8,518,573	143
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-12-31	2013-Q4	12	NULL	1,606,321,540	25988
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-12-31	2013-Q4	12	30 to 90	2,670,726	70
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-12-31	2013-Q4	12	360+	8,695,473	326
BE	2009	SMEMBE000095100220092	ECB	Construction ai	2013-12-31	2013-Q4	12	90 to 360	7,880,699	156

- Select where loan amount >0
- Group by any feature to be shown in the index
- The data as shown here allows for an index by country, vintage, deal industry, period (quarter)
- Performance can be displayed in various buckets
- By loan amounts or number of loans in arrears

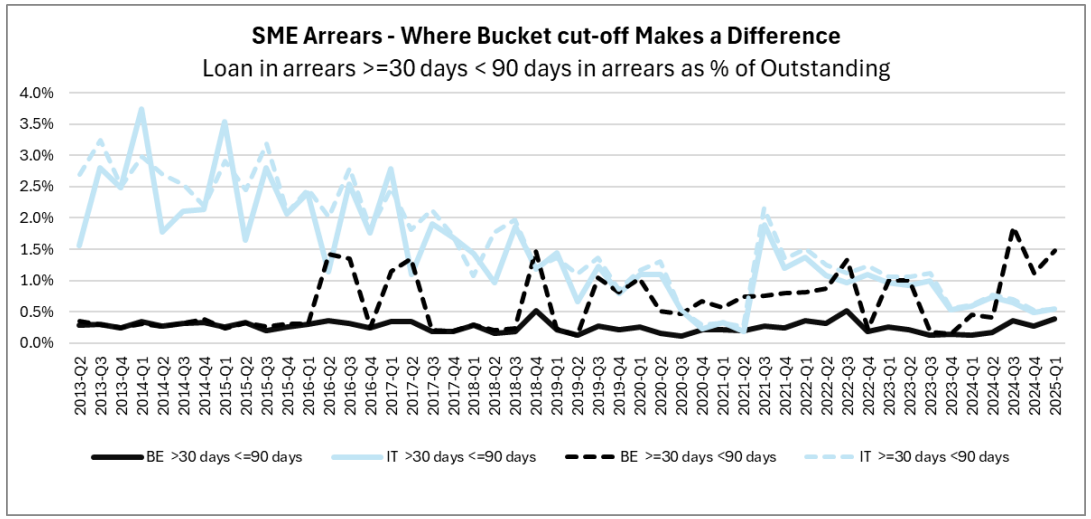
PERFORMANCE INDICES – SELECTING THE ARREARS BUCKETS

THE DIFFERENCE CHANGE IN BUCKET CUT-OFF MAKES



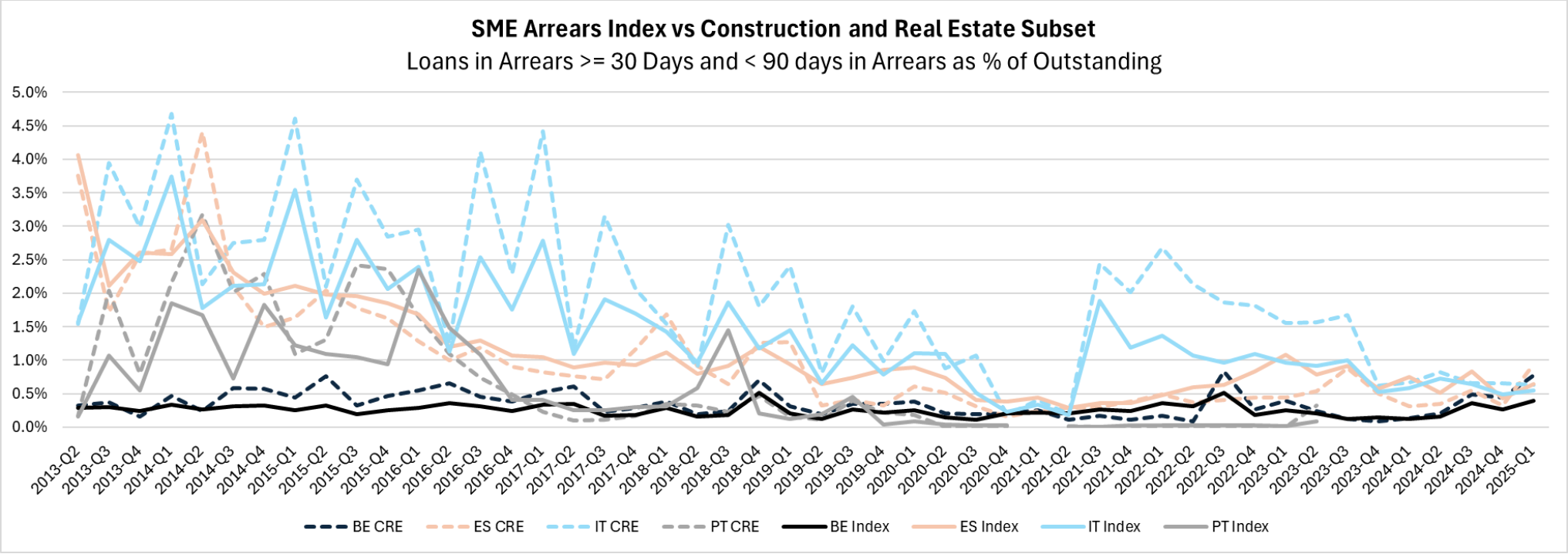


- As it turns out, the number of days in Arrears reported is often rounded up to 30 days!!
- This leads to a lot of peaks in the first chart with values generally higher for Italy and Belgium, for instance



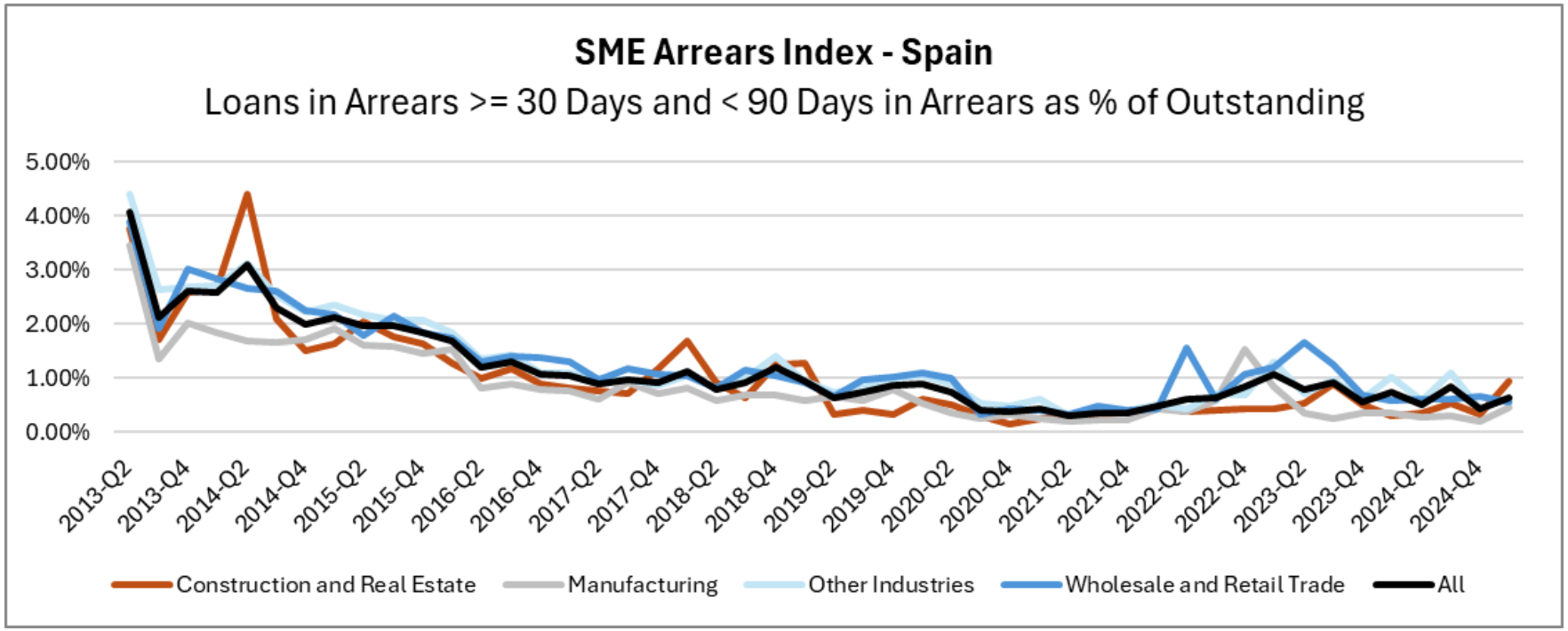
PERFORMANCE INDICES – INDUSTRY SPECIFIC INDEX

CONSTRUCTION AND REAL ESTATE IS GENERALLY MORE RISKY



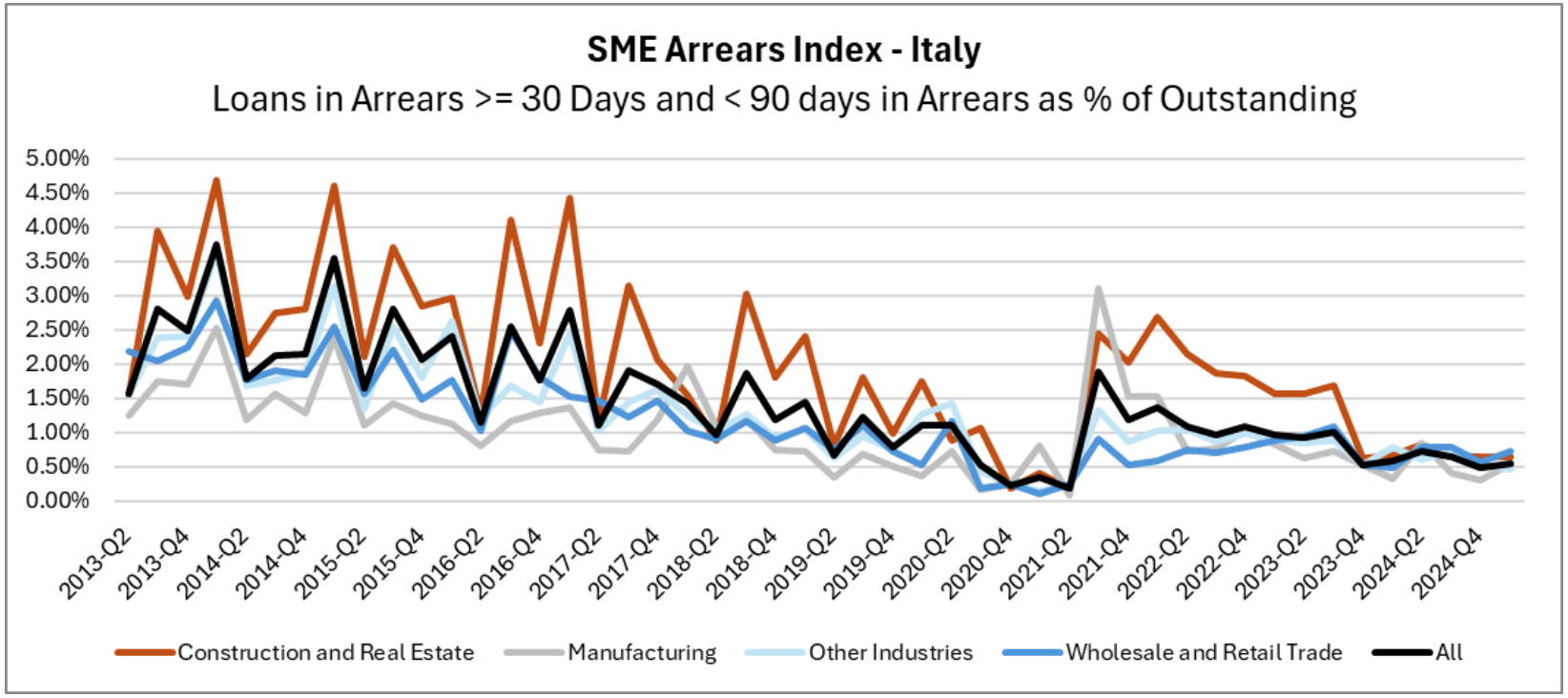
PERFORMANCE INDICES – INDUSTRY SPECIFIC INDEX SPAIN

CONSTRUCTION AND REAL ESTATE IS GENERALLY MORE RISKY



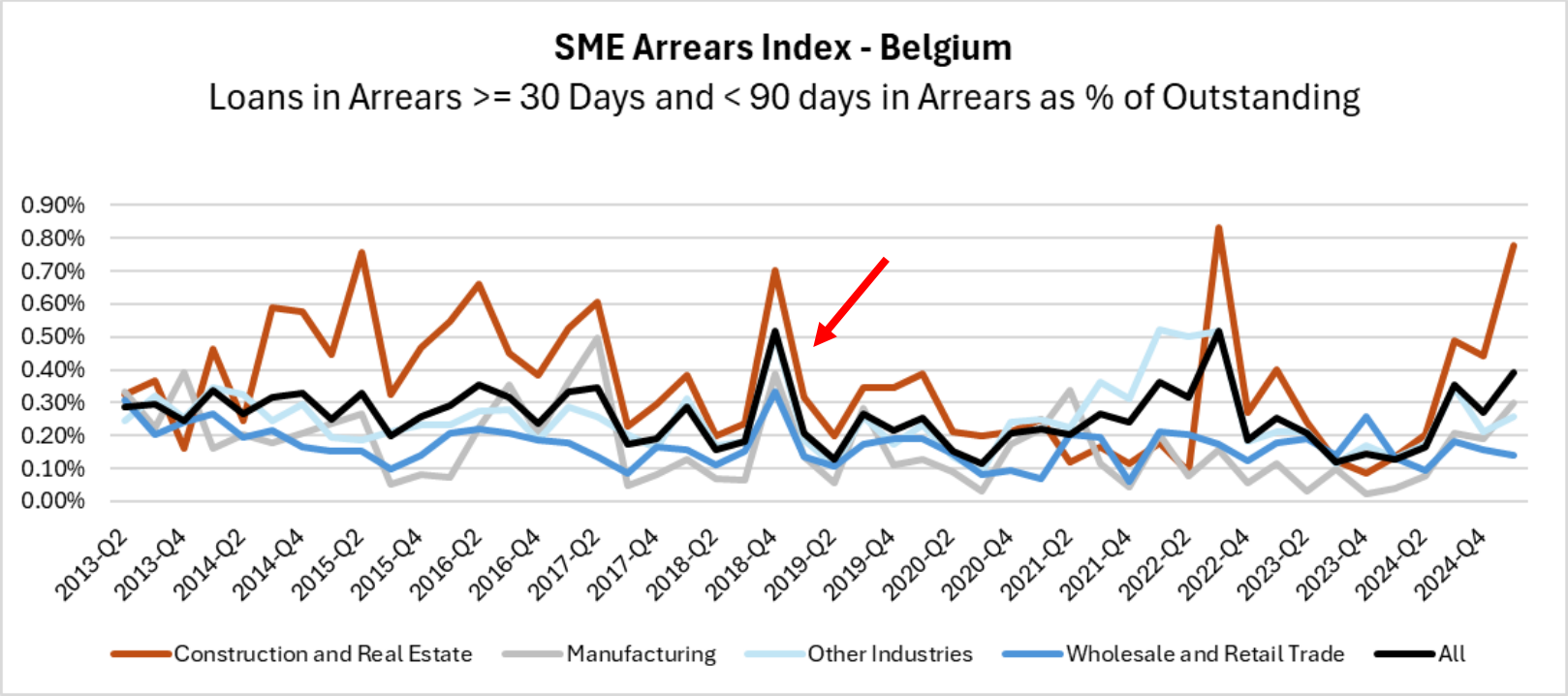
PERFORMANCE INDICES – INDUSTRY SPECIFIC INDEX ITALY

CONSTRUCTION AND REAL ESTATE IS GENERALLY MORE RISKY



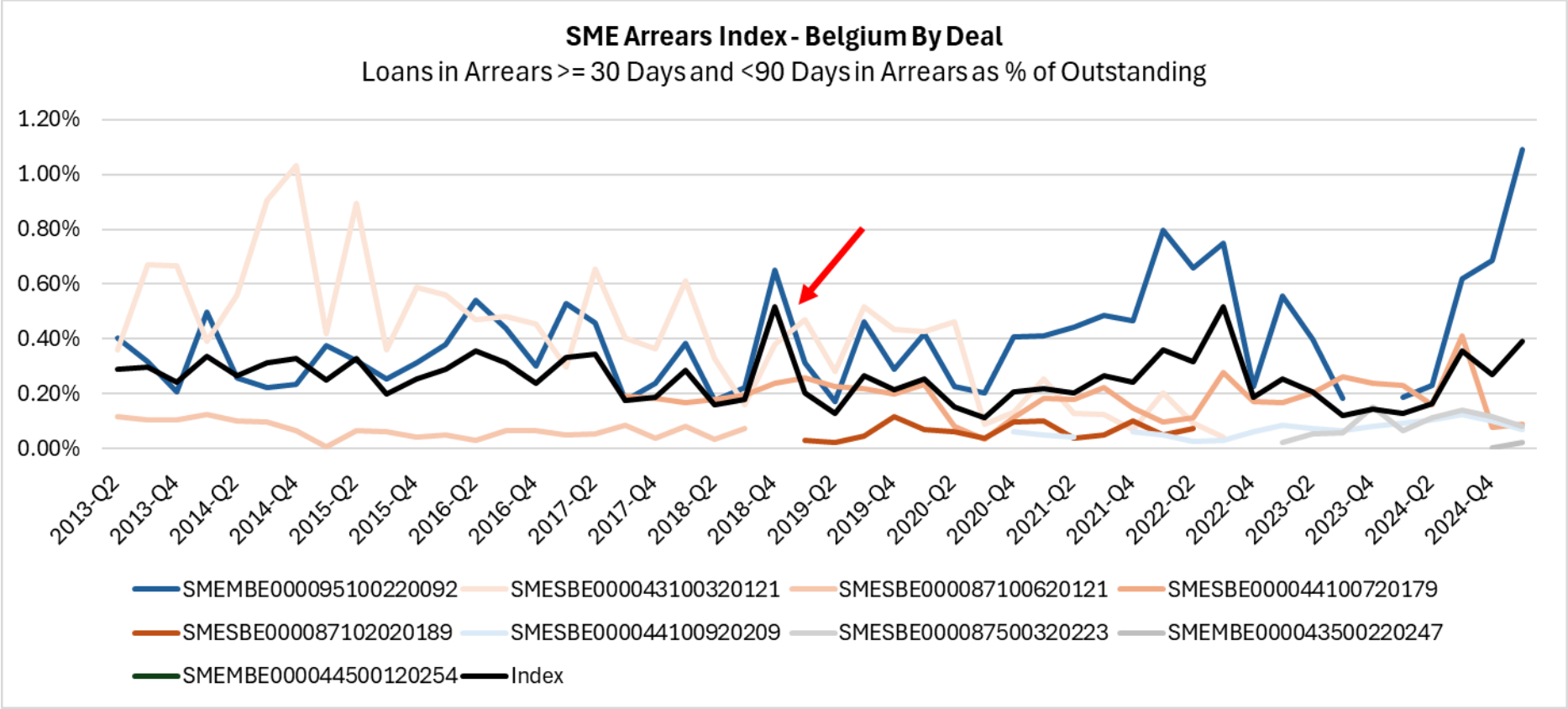
PERFORMANCE INDICES – INDUSTRY SPECIFIC INDEX BELGIUM

CONSTRUCTION AND REAL ESTATE IS GENERALLY MORE RISKY



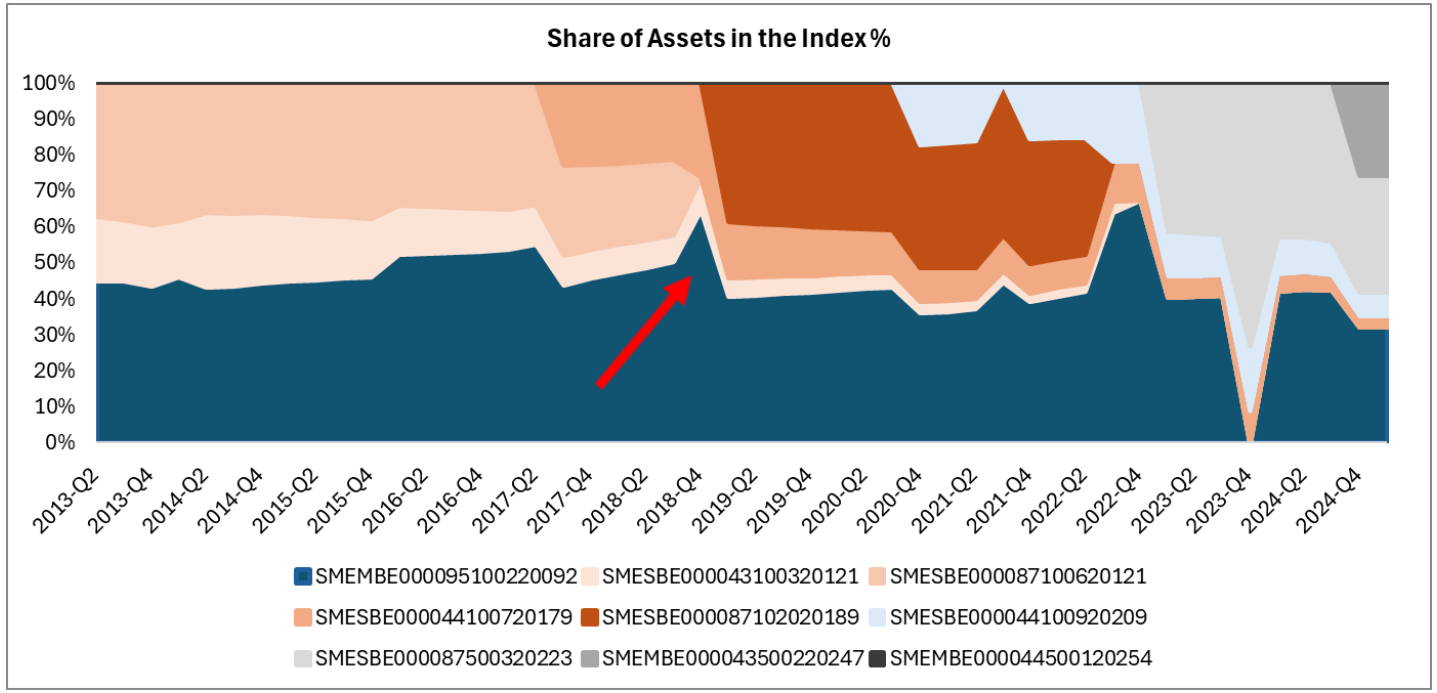
PERFORMANCE INDICES – WHY THE SPIKE?

CONCENTRATION EFFECTS MATTER



PERFORMANCE INDICES – INDEX COMPOSITION OVERTIME…

ARREARS IN ONE LARGE DEAL CAN HAVE A LOT OF IMPACT



After investigation, the spike in arrears in the index chart is due to one large loan of EUR13.6 million for a hotel (NACE I55.1) that went in arrears in this period and went back to performing afterwards…

PERFORMANCE INDICES – FINDING THE ROOT CAUSE…

LIST OF LOANS IN ARREARS IN THE 30-90 BUCKET IN THIS DEAL WITH A BALANCE IN EXCESS OF 1 MILLION

EDCODE	PCD	QTR	CRPL2	CRPL4	CRPL78	crpl39	CRPL14
SMEMBE0000951(	30/09/2018	2018-Q3	…	…	72	1,161,667	**L68.2**
SMEMBE0000951(	30/09/2018	2018-Q3	…	…	90	1,098,596	S94.9.1
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	1,304,281	K64.2
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	13,578,695	I55.1
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	1,150,000	C28.9.2
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	1,800,000	C25.6.1
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	31	1,254,407	M70.2.2
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	46	2,141,905	**L68.2**
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	61	3,068,855	**L68.2**
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	61	2,339,475	**L68.2**
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	2,598,750	**L68.1**
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	2,250,000	G46.7.3
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	2,452,500	**L68.2**
SMEMBE0000951(	31/12/2018	2018-Q4	…	…	90	2,163,333	**L68.2**
SMEMBE0000951(	31/03/2019	2019-Q1	…	…	58	1,951,129	**L68.2**
SMEMBE0000951(	31/03/2019	2019-Q1	…	…	75	1,361,059	**L68.2**
SMEMBE0000951(	31/03/2019	2019-Q1	…	…	31	1,570,977	**L68.2**

On top of this large loan, in this period, several loans in the category L68 (buying selling renting of real estate i.e. real estate developers…)

WHY UPLOAD OVERLAPS MATTER

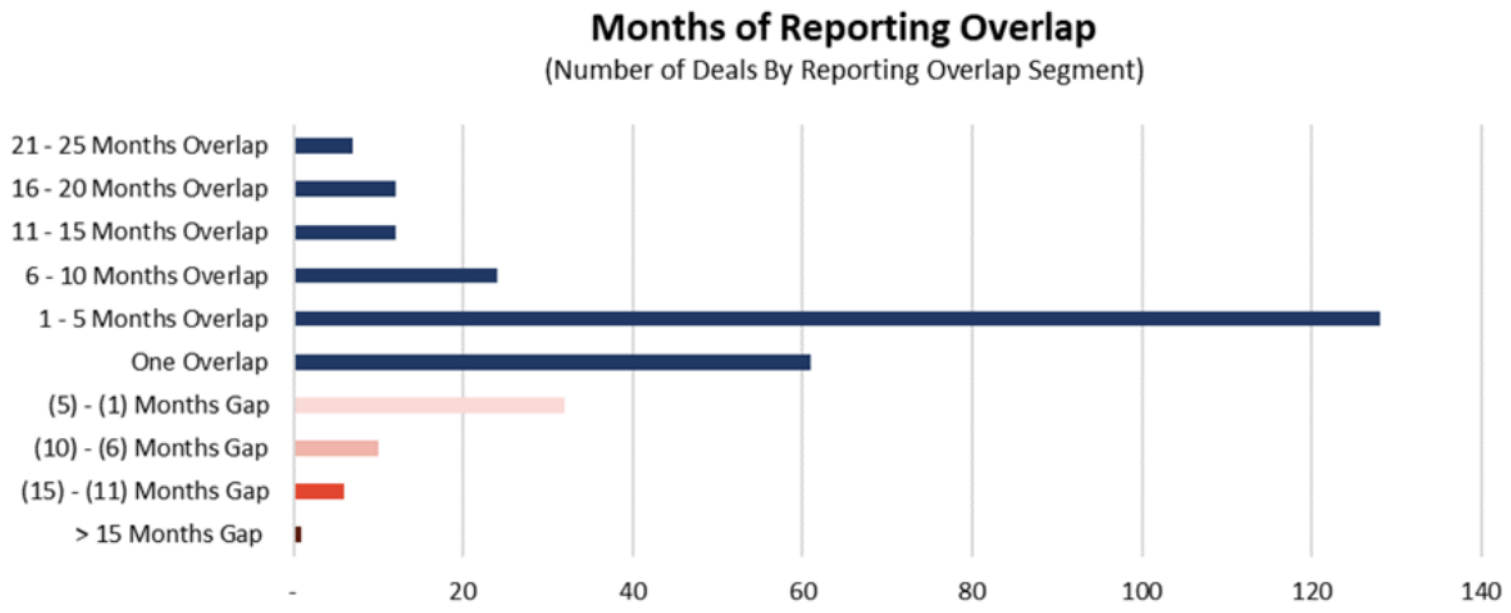
ECB TO ESMA TRANSLATION

ECB			ESMA	
Origination Channel (AR58)			**Origination Channel (RREL26)**	
Office / branch network	1	→	BRAN	Office or Branch Network
Central / Direct	2	→	DRCT	Central or Direct
Broker	3	→	BROK	Broker
Internet	4	→	WEBI	Internet
Packager	5	→	TPAC	Package
Third channel but underwriting processes performed 100% by the Originator	6	→	TPTC	Third Party Channel but Underwriting Perfromed Entirely by the Originator

- Some ECB fields have the same name and the same options as their ESMA equivalent and can therefore be translated 1 to 1.
- Data from the field AR58 goes 1 to 1 in the corresponding options of field RREL26 of the “All in One Database”

MOST OVERLAPS FOR 1 OR 2 PERIODS

MOST OVERLAPS WERE FOR 1 OR TWO UPLOADS, SOMETIMES MORE...



Source: ecb-esma reporting overlap helps data interpretation

DATA INVENTORY INCLUDES A LIST OF OVERLAPS

THE NEW DATA INVENTORY REFERENCES ECB – ESMA DATA OVERLAPS

Data overlaps

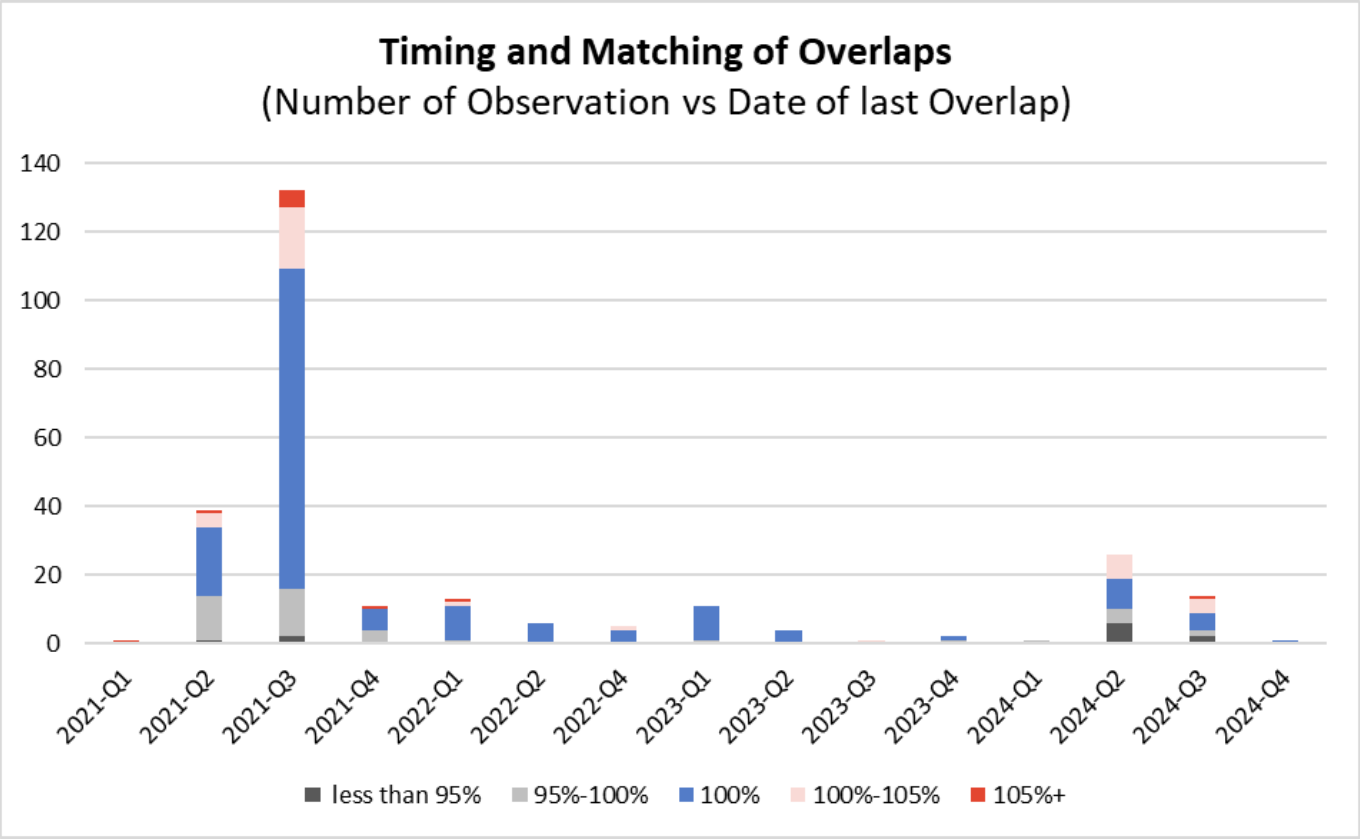
- Some data was reported for a given period both in ECB and ESMA formats
- Same deal same date different reporting template, they make comparisons possible!

Summary

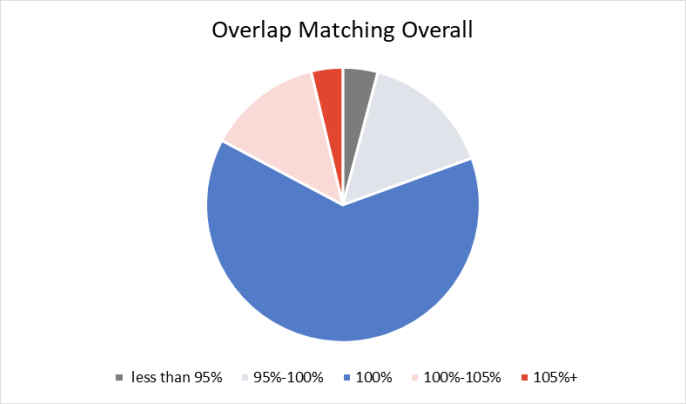
EDCODE	SEC_ID	country	pcd	data_origir	Currency	Current_Amount	Match	Quarter	Country	Asset class	Match category
AUTMDE000245104120153	NULL	DE	2021-08-31	ecb	EUR	14,735,580,579	100.0%	2021-Q3	DE	AUT	100%
AUTMDE000245104120153	529900GJD3OQLRZCKW37N201502	DE	2021-08-31	esma	EUR	14,735,580,579					
AUTMDE000283100320147	NULL	DE	2021-08-31	ecb	EUR	2,144,792,677	93.5%	2021-Q3	DE	AUT	less than 95%
AUTMDE000283100320147	96950001WI712W7PQG45N201401	DE	2021-08-31	esma	EUR	2,294,890,887					
AUTMFR000101100320122	NULL	FR	2021-08-31	ecb	EUR	1,274,880,831	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	FR	2021-08-31	esma	EUR	1,274,880,831					
AUTMFR000101101020200	NULL	FR	2021-07-31	ecb	EUR	666,668,628	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101101020200	9695001JVUL7KOY1WU66N202001	FR	2021-07-31	esma	EUR	666,668,628					
AUTMFR000262100720123	NULL	FR	2021-07-31	ecb	EUR	1,960,539,765	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000262100720123	969500C6V7XE6KJJW795N201201	FR	2021-07-31	esma	EUR	1,960,539,765					
AUTMNL000245105620163	NULL	NL	2021-12-31	ecb	EUR	1,036,368,303	106.1%	2021-Q4	NL	AUT	105%+
AUTMNL000245105620163	529900WMURPIJX3VA643N201601	NL	2021-12-31	esma	EUR	977,137,292					
AUTSAT102332100220209	NULL	AT	2021-08-31	ecb	EUR	437,045,831	100.0%	2021-Q3	AT	AUT	100%
AUTSAT102332100220209	5299000I7Y60A8273788N202001	AT	2021-08-31	esma	EUR	437,045,831					
AUTSDE000115101220198	NULL	DE	2022-03-31	ecb	EUR	375,556,713	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101220198	D2OIGPB6E66YOBJ9GT20N201902	DE	2022-03-31	esma	EUR	375,556,713					
AUTSDE000115101420202	NULL	DE	2022-03-31	ecb	EUR	371,735,975	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101420202	D2OIGPB6E66YOBJ9GT20N202001	DE	2022-03-31	esma	EUR	371,735,975					
AUTSDE000115101620215	NULL	DE	2022-03-31	ecb	EUR	923,899,954	106.4%	2022-Q1	DE	AUT	105%+
AUTSDE000115101620215	D2OIGPB6E66YOBJ9GT20N202101	DE	2022-03-31	esma	EUR	868,517,784					

TIMING OF OVERLAPS

A BIG WAVE OF TRANSFER IN 2021, A WAVELET IN 2024.



- Post-2019 deals reported only in ESMA format
- Deals terminated before Q3 2024 never needed to switch to ESMA format
- Pre-2019 deals that still exist had to do the switch



HOW TO TRACE LOAN IDENTIFIERS?

LOAN AND BORROWER ID CONSISTENCY: REOCCURENCE SCORES

A RE-OCCURENCE SCORE IS THE % OF IDS IN A PERIOD THAT WERE ALREADY PRESENT IN THE PREVIOUS UPLOAD

- SEE EDW'S "UNDERSTANDING EDW'S LOAN IDENTIFIER REOCCURRENCE SCORE"

EDCODE	ID Field (ECB)	FirstEntr	Avg. Reoccuren	2013-Q1	2013-Q2	2013-Q3	2013-Q4	2014-Q1	2014-Q2	2014-Q3	2014-Q4	2015-Q1	2015-Q2	2015-Q3	2015-Q4	2016-Q1	2016-Q2	2016-Q3
iSES000045101220079	AR8	2013-Q1	99.83%	START	99.95%	100.00%	100.00%	99.90%	100.00%	100.00%	100.00%	98.83%						
iSES000045101320077	AR3	2013-Q1	97.37%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000045101320077	AR7	2013-Q1	98.70%	START	100.00%	50.62%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000045101320077	AR8	2013-Q1	91.45%	START	100.00%	100.00%	100.00%	100.00%	75.00%	0.05%	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.0
iSES000045101420083	AR3	2013-Q1	75.00%	START	100.00%	100.00%	0.00%	100.00%										
iSES000045101420083	AR7	2013-Q1	99.93%	START	100.00%	99.74%	100.00%	100.00%										
iSES000045101420083	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%										
iSES000045101520072	AR3	2013-Q1	95.45%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000045101520072	AR7	2013-Q1	89.77%	START	100.00%	87.08%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	87.55%	100.00%	0.16%	0.1
iSES000045101520072	AR8	2013-Q1	95.39%	START	100.00%	100.00%	100.00%	99.88%	100.00%	100.00%	100.00%	100.00%	0.12%	100.00%	100.00%	100.00%	99.60%	99.8
iSES000045101620088	AR3	2013-Q1	51.70%	START	6.80%	100.00%	0.00%	100.00%										
iSES000045101620088	AR7	2013-Q1	99.00%	START	100.00%	96.00%	100.00%	100.00%										
iSES000045101620088	AR8	2013-Q1	50.06%	START	0.25%	100.00%	0.08%	100.00%										
iSES000060100120048	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100120048	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100120048	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100220061	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100220061	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100220061	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.0
iSES000060100420026	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100420026	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100420026	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100520072	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100520072	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100520072	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	99.99%	100.00%	100.0
iSES000060100620088	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100620088	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100620088	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.9
iSES000060100720029	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%					
iSES000060100720029	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%					
iSES000060100720029	AR8	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%					
iSES000060100820035	AR3	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
iSES000060100820035	AR7	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

DATA INVENTORY INCLUDES A LIST OF OVERLAPS

THE NEW DATA INVENTORY REFERENCES ECB - ESMA DATA OVERLAPS

Data overlaps

- Some data was reported for a given period both in ECB and ESMA formats
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EDCODE	SEC_ID	country	pcd	data_origi	Currency	Current_Amount	Match	Quarter	Country	Asset class	Match category
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AUTMDE000245104120153	529900GJD3OQLRZCKW37N201502	DE	2021-08-31	esma	EUR	14,735,580,579					
AUTMDE000283100320147	NULL	DE	2021-08-31	ecb	EUR	2,144,792,677	93.5%	2021-Q3	DE	AUT	less than 95%
AUTMDE000283100320147	96950001WI712W7PQG45N201401	DE	2021-08-31	esma	EUR	2,294,890,887					
AUTMFR000101100320122	NULL	FR	2021-08-31	ecb	EUR	1,274,880,831	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	FR	2021-08-31	esma	EUR	1,274,880,831					
AUTMFR000101101020200	NULL	FR	2021-07-31	ecb	EUR	666,668,628	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101101020200	9695001JVUL7KOY1WU66N202001	FR	2021-07-31	esma	EUR	666,668,628					
AUTMFR000262100720123	NULL	FR	2021-07-31	ecb	EUR	1,960,539,765	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000262100720123	969500C6V7XE6KJJW795N201201	FR	2021-07-31	esma	EUR	1,960,539,765					
AUTMNL000245105620163	NULL	NL	2021-12-31	ecb	EUR	1,036,368,303	106.1%	2021-Q4	NL	AUT	105%+
AUTMNL000245105620163	529900WMURPIJX3VA643N201601	NL	2021-12-31	esma	EUR	977,137,292					
AUTSAT102332100220209	NULL	AT	2021-08-31	ecb	EUR	437,045,831	100.0%	2021-Q3	AT	AUT	100%
AUTSAT102332100220209	5299000I7Y60A8273788N202001	AT	2021-08-31	esma	EUR	437,045,831					
AUTSDE000115101220198	NULL	DE	2022-03-31	ecb	EUR	375,556,713	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101220198	D2OIGPB6E66YOBJ9GT20N201902	DE	2022-03-31	esma	EUR	375,556,713					
AUTSDE000115101420202	NULL	DE	2022-03-31	ecb	EUR	371,735,975	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101420202	D2OIGPB6E66YOBJ9GT20N202001	DE	2022-03-31	esma	EUR	371,735,975					
AUTSDE000115101620215	NULL	DE	2022-03-31	ecb	EUR	923,899,954	106.4%	2022-Q1	DE	AUT	105%+
AUTSDE000115101620215	D2OIGPB6E66YOBJ9GT20N202101	DE	2022-03-31	esma	EUR	868,517,784					

DATA INVENTORY INCLUDES A LIST OF OVERLAPS

IN THIS OVERLAPPING UPLOADS, SAME IDS, SAME AMOUNTS

EDCODE	pcd	data_origi	AUTL2	AUTL30
AUTMFR000101101020200	31/07/2021	ECB	++QMuNuxc1i5CLdkTABs2Gzjp+fifqDKUg	5045.56
AUTMFR000101101020200	31/07/2021	ESMA	++QMuNuxc1i5CLdkTABs2Gzjp+fifqDKUg	5045.56
AUTMFR000101101020200	31/07/2021	ECB	++RyuI6xk1hYCGhkKgBsMtWCa8D2fO2LkQ	3956.84
AUTMFR000101101020200	31/07/2021	ESMA	++RyuI6xk1hYCGhkKgBsMtWCa8D2fO2LkQ	3956.84
AUTMFR000101101020200	31/07/2021	ECB	++SpuIyxPVjMCGtk3gBsA+nrFOjV6AIfXQ	6074.52
AUTMFR000101101020200	31/07/2021	ESMA	++SpuIyxPVjMCGtk3gBsA+nrFOjV6AIfXQ	6074.52
AUTMFR000101101020200	31/07/2021	ECB	++TDuDax2FgWCPFk+wBs5Qbski7cLUX0/Q	7394.89
AUTMFR000101101020200	31/07/2021	ESMA	++TDuDax2FgWCPFk+wBs5Qbski7cLUX0/Q	7394.89
AUTMFR000101101020200	31/07/2021	ECB	+0EhxVFl8Q6h0fkkJfXwIe9aOvUlaxuSZA	5391.53
AUTMFR000101101020200	31/07/2021	ESMA	+0EhxVFl8Q6h0fkkJfXwIe9aOvUlaxuSZA	5391.53
AUTMFR000101101020200	31/07/2021	ECB	+0Erxdhlmg5z0ewk9vXwxS44/tok6cdeOQ	9483.89
AUTMFR000101101020200	31/07/2021	ESMA	+0Erxdhlmg5z0ewk9vXwxS44/tok6cdeOQ	9483.89
AUTMFR000101101020200	31/07/2021	ECB	+0FrxStlrw7E0c4k6PXwlPOWelk7c4HCDw	8811.26
AUTMFR000101101020200	31/07/2021	ESMA	+0FrxStlrw7E0c4k6PXwlPOWelk7c4HCDw	8811.26
AUTMFR000101101020200	31/07/2021	ECB	+0FsxRFlqA460W0kpPXw3aitNujeMQb+KQ	15125.06
AUTMFR000101101020200	31/07/2021	ESMA	+0FsxRFlqA460W0kpPXw3aitNujeMQb+KQ	15125.06
AUTMFR000101101020200	31/07/2021	ECB	+0GMxY5IaA4T0RIkIPXwcP2CvAUF3bbiWA	4666.43

- Select edcode, pcd, data origin, loan ID, loan amount into one table where loan amount >0
- Order by loan ID then origin
- Every loan ID should appear exactly twice, every loan amount should appear exactly twice.

DATA INVENTORY INCLUDES A LIST OF OVERLAPS

THE NEW DATA INVENTORY REFERENCES ECB – ESMA DATA OVERLAPS

Data overlaps

- Some data was reported for a given period both in ECB and ESMA formats
- Same deal same date different reporting template, they make comparisons possible!

Summary

EDCODE	SEC_ID	country	pcd	data_origir	Currency	Current_Amount	Match	Quarter	Country	Asset class	Match category
AUTMDE000245104120153	NULL	DE	2021-08-31	ecb	EUR	14,735,580,579	100.0%	2021-Q3	DE	AUT	100%
AUTMDE000245104120153	529900GJD3OQLRZCRW37N201302	DE	2021-08-31	esma	EUR	14,735,580,579					
AUTMDE000283100320147	NULL	DE	2021-08-31	ecb	EUR	2,144,792,677	93.5%	2021-Q3	DE	AUT	less than 95%
AUTMDE000283100320147	96950001WI712W7PQG45N201401	DE	2021-08-31	esma	EUR	2,294,890,887					
AUTMFR000101100320122	NULL	FR	2021-08-31	ecb	EUR	1,274,880,831	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	FR	2021-08-31	esma	EUR	1,274,880,831					
AUTMFR000101101020200	NULL	FR	2021-07-31	ecb	EUR	666,668,628	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000101101020200	9695001JVUL7KOY1WU66N202001	FR	2021-07-31	esma	EUR	666,668,628					
AUTMFR000262100720123	NULL	FR	2021-07-31	ecb	EUR	1,960,539,765	100.0%	2021-Q3	FR	AUT	100%
AUTMFR000262100720123	969500C6V7XE6KJJW795N201201	FR	2021-07-31	esma	EUR	1,960,539,765					
AUTMNL000245105620163	NULL	NL	2021-12-31	ecb	EUR	1,036,368,303	106.1%	2021-Q4	NL	AUT	105%+
AUTMNL000245105620163	529900WMURPIJX3VA643N201601	NL	2021-12-31	esma	EUR	977,137,292					
AUTSAT102332100220209	NULL	AT	2021-08-31	ecb	EUR	437,045,831	100.0%	2021-Q3	AT	AUT	100%
AUTSAT102332100220209	5299000I7Y60A8273788N202001	AT	2021-08-31	esma	EUR	437,045,831					
AUTSDE000115101220198	NULL	DE	2022-03-31	ecb	EUR	375,556,713	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101220198	D2OIGPB6E66YOBJ9GT20N201902	DE	2022-03-31	esma	EUR	375,556,713					
AUTSDE000115101420202	NULL	DE	2022-03-31	ecb	EUR	371,735,975	100.0%	2022-Q1	DE	AUT	100%
AUTSDE000115101420202	D2OIGPB6E66YOBJ9GT20N202001	DE	2022-03-31	esma	EUR	371,735,975					
AUTSDE000115101620215	NULL	DE	2022-03-31	ecb	EUR	923,899,954	106.4%	2022-Q1	DE	AUT	105%+
AUTSDE000115101620215	D2OIGPB6E66YOBJ9GT20N202101	DE	2022-03-31	esma	EUR	868,517,784					

DATA INVENTORY INCLUDES A LIST OF OVERLAPS

IN THIS OVERLAPPING UPLOADS, SAME IDS, CURRENT AMOUNTS ARE DIFFERENT

EDCODE	pcd	data_origi	AUTL2	AUTL4	AUTL24	AUTL29	AUTL30
AUTMDE000283100320147	31/08/2021	ECB	103598914/001	3931197	2014-02	16,900	1,515
AUTMDE000283100320147	31/08/2021	ESMA	103598914/001	3931197	2014-02-26	16,900	1,515
AUTMDE000283100320147	31/08/2021	ECB	103616102/001	3939648	2014-03	16,264	1,610
AUTMDE000283100320147	31/08/2021	ESMA	103616102/001	3939648	2014-03-18	16,264	1,610
AUTMDE000283100320147	31/08/2021	ECB	103621991/001	3937052	2014-03	16,410	1,625
AUTMDE000283100320147	31/08/2021	ESMA	103621991/001	3937052	2014-03-24	16,410	1,625
AUTMDE000283100320147	31/08/2021	ECB	103628994/001	3280121	2014-03	20,212	2,001
AUTMDE000283100320147	31/08/2021	ESMA	103628994/001	3280121	2014-03-31	20,212	2,001
AUTMDE000283100320147	31/08/2021	ECB	103643034/001	3949144	2014-04	15,373	1,356
AUTMDE000283100320147	31/08/2021	ESMA	103643034/001	3949144	2014-04-14	15,373	1,522
AUTMDE000283100320147	31/08/2021	ECB	103643625/001	279172	2014-04	25,800	2,464
AUTMDE000283100320147	31/08/2021	ESMA	103643625/001	279172	2014-04-14	25,800	2,472
AUTMDE000283100320147	31/08/2021	ECB	103646165/001	2391552	2014-04	19,737	1,714
AUTMDE000283100320147	31/08/2021	ESMA	103646165/001	2391552	2014-04-17	19,737	1,891
AUTMDE000283100320147	31/08/2021	ECB	103654315/001	3952105	2014-05	14,707	1,537
AUTMDE000283100320147	31/08/2021	ESMA	103654315/001	3952105	2014-05-02	14,707	1,740

- Select edcode, pcd, data origin, loan ID, borrower ID, original amount, current loan amount into one table where loan amount >0
- Order by loan ID then origin
- AUTL2 appear exactly twice which points at consistent ID reporting
- Original amount the same original date the same (ESMA has day precision)
- Current amount sometimes differ

HOW TO CALCULATE PREPAYMENTS?

PREPAYMENT RELATED DATA IN ESMA REPORTING (1)

PREPAYMENTS IN ESMA REPORTING

Reporting at the deal level

Actual prepayment rates are available as part of investor reports and standardised ESMA Annex 12 investor reports, and field IVSS22 shows the annualised Constant Prepayment Rate. It is a periodic prepayment rate calculated with the prepayments for the asset pool and annualised.

IVSS22	Annualised Constant Prepayment Rate	The annualised Constant Prepayment Rate (CPR) of the underlying exposures based upon the most recent periodic CPR. Periodic CPR is equal to the [(total unscheduled principal received at the end of the most recent collection period) / (the total principal balance at the start of the collection period)]. The Periodic CPR is then annualised as follows: 100*(1-((1-Periodic CPR)^number of collection periods in a year)) 'Periodic CPR' refers to the CPR during the last collection period i.e. for a securitisation with quarterly paying bonds this will usually be the prior three month period.

Reporting at the loan level

- Cumulative Prepaid amount : field RREL64 for mortgages, CRPL74 for SMEs, AUTL52 for Auto, CMRL50 for cons
- But also % of prepayment allowed, prepayment lock out end date, prepayment fee, prepayment fee end
- Far less details were supplied in the ECB format

PREPAYMENT RELATED DATA IN ESMA REPORTING (2)

PREPAYMENTS IN ESMA LOAN LEVEL REPORTING (RMBS)

RREL59	Percentage Of Prepayments Allowed Per Year	Percentage amount of pre-payments allowed under the product per year. This is for underlying exposures that allow a certain threshold of pre-payments (i.e. 10%) before charges are incurred.
RREL60	Prepayment Lock-Out End Date	The date after which the lender allows prepayment of the underlying exposure.
RREL61	Prepayment Fee	Amount collected from the obligor as the fee/penalty due for making prepayments as required under the terms of the underlying exposure agreement. This is not intended to include any amounts paid as a "break cost" to make up interest payments up to the underlying exposure Payment Date. This includes amounts collected that have not been securitised. Include the currency in which the amount is denominated, using {CURRENCYCODE_3} format.
RREL62	Prepayment Fee End Date	The date after which the lender allows prepayment of the underlying exposure without requirement for a prepayment fee to be paid.
RREL63	Prepayment Date	The latest date on which an unscheduled principal payment was received.
RREL64	Cumulative Prepayments	Total prepayments collected as at the data cut-off date (prepayments defined as unscheduled principal payment) since the underlying exposure origination date. Include the currency in which the amount is denominated, using {CURRENCYCODE_3} format.

RECALCULATING PREPAYMENTS

STEP 1: SELECT THE RELEVANT DATA

Data selection:

- The prepayment calculation is only relevant for performing loans for which loan Identifiers are reported consistently
- First select for a given deal the fields RREL29, RREL43, RREL25, RREL30 (current balance) along with PCD and loan ID
- Arrange by loan ID and PCD
- The following calculation can be applied at the loan level and makes it possible to calculate the scheduled balance for a typical loan with the same payment every month and fixed interest rate (French/annuity)

RREL29*(1-(1+RREL43/1200)^(- Remaining Months to Maturity))/(1-(1+RREL43/1200)^(-RREL25))

Where:

RREL29 = original principal balance

RREL43 = interest rate (assuming fixed interest rate; reported as 2 if 2%)

RREL25 = original term (in number of months)

RECALCULATING PREPAYMENTS

STEP 2: CALCULATE THE SCHEDULED BALANCE

The following formula makes it possible to calculate the scheduled principal amount at a given point in time:

RREL29*(1-(1+RREL43/1200)^(- Remaining Months to Maturity))/(1-(1+RREL43/1200)^(-RREL25))

=$D$4*(1-(1+$D$5/12)^(-J12))/(1-(1+$D$5/12)^(-$H$5))

Workbook last saved: Just now

Simple Loan Calculator

Loan Values	
Loan amount	€ 100,000.00
Annual interest rate	5.00%
Loan period in years	10
Start date of loan	23/06/2025

Loan Summary	
Monthly payment	$1,060.66
Number of payments	120
Total interest	$27,278.62
Total cost of loan	$127,278.62

Pmt No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance	Remaining months to maturity	Scheduled (a) € 100,000.00	Current Ba € 10
1	23/07/2025	€ 100,000.00	€ 1,060.66	€ 643.99	€ 416.67	€ 99,356.01	119	€ 99,356.01	€ 9
2	23/08/2025	€ 99,356.01	€ 1,060.66	€ 646.67	€ 413.98	€ 98,709.34	118	€ 98,709.34	€ 9
3	23/09/2025	€ 98,709.34	€ 1,060.66	€ 649.37	€ 411.29	€ 98,059.97	=$D$4*(1-(1+$D$5/12)^(-J12))/(1-(1+$D$5/12)^(-$H$5))	€	€ 9
4	23/10/2025	€ 98,059.97	€ 1,060.66	€ 652.07	€ 408.58	€ 97,407.90	116	€ 97,407.90	€ 9
5	23/11/2025	€ 97,407.90	€ 1,060.66	€ 654.79	€ 405.87	€ 96,753.11	115	€ 96,753.11	€ 9
6	23/12/2025	€ 96,753.11	€ 1,060.66	€ 657.52	€ 403.14	€ 96,095.60	114	€ 96,095.60	€ 9
7	23/01/2026	€ 96,095.60	€ 1,060.66	€ 660.26	€ 400.40	€ 95,435.34	113	€ 95,435.34	€ 9
8	23/02/2026	€ 95,435.34	€ 1,060.66	€ 663.01	€ 397.65	€ 94,772.33	112	€ 94,772.33	€ 9
9	23/03/2026	€ 94,772.33	€ 1,060.66	€ 665.77	€ 394.88	€ 94,106.56	111	€ 94,106.56	€ 9
10	23/04/2026	€ 94,106.56	€ 1,060.66	€ 668.54	€ 392.11	€ 93,438.02	110	...	
11	23/05/2026	€ 93,438.02	€ 1,060.66	€ 671.33	€ 389.33	€ 92,766.69	109		
12	23/06/2026	€ 92,766.69	€ 1,060.66	€ 674.13	€ 386.53	€ 92,092.56	108		
13	23/07/2026	€ 92,092.56	€ 1,060.66	€ 676.94	€ 383.72	€ 91,415.62	107		

RECALCULATING PREPAYMENTS

CALCULATING THE PREPAID AMOUNT FROM THE SCHEDULED AMOUNT AND THE ACTUAL CURRENT BALANCE

The following formula makes it possible to calculate the scheduled principal amount at a given point in time:

RREL29*(1-(1+RREL43/1200)^(- Remaining Months to Maturity))/(1-(1+RREL43/1200)^(-RREL25))

Scheduled (a)	Current Balance (b)	Cumulative prepayed (a-b) =c	Periodic prepayed Ct+1 - Ct	CPR
€ 100,000.00	€ 100,000.00		*Prepayment amount for the loan for the period*	
€ 99,356.01	€ 98,929.48	€ 426.53	€ 426.53	5.000%
€ 98,709.34	€ 97,860.84	€ 848.50	€ 421.97	5.000%
€ 98,059.97	€ 96,794.07	€ 1,265.91	€ 417.41	5.000%
€ 97,407.90	€ 95,729.14	€ 1,678.76	€ 412.86	5.000%
€ 96,753.11	€ 94,666.03	€ 2,087.08	€ 408.32	5.000%
€ 96,095.60	€ 93,604.74	€ 2,490.86	€ 403.78	5.000%
€ 95,435.34	€ 92,545.23	€ 2,890.11	€ 399.25	5.000%
€ 94,772.33	€ 91,487.48	€ 3,284.85	€ 394.73	5.000%
€ 94,106.56	€ 90,431.49	€ 3,675.07	€ 390.22	5.000%

...

PARTIAL PREPAYMENTS CALCULATION (REAL LIFE)

LOAN-LEVEL EXAMPLE FOR A FIXED-RATE MORTGAGE

INCOME	MONTHLY PAYMENTS	QTR	RTM	ORIGINAL BALANCE	CURRENT BALANCE	SCHEDULED CURRENT BALANCE	CUMULATIVE PREPAYMENTS	CUMULATIVE PREPAYMENTS PREVIOUS QTR	PERIODIC PREPAYMENTS
98,400	1,013	2019-Q1	85	173,000	75,894	75,896	2	1.00	0.00
98,400	1,013	2019-Q2	82	173,000	73,532	73,534	2	1.00	0.00
98,400	1,013	2019-Q3	79	173,000	71,149	71,151	2	1.00	0.00
98,400	1,013	2019-Q4	76	173,000	68,744	68,746	2	1.00	0.00
98,400	1,013	2020-Q1	73	173,000	66,318	66,320	2	1.00	0.00
98,400	1,013	2020-Q2	70	173,000	63,869	63,871	2	1.00	1.00
98,400	1,013	2020-Q3	67	173,000	61,399	61,401	2	2.00	0.00
98,400	1,013	2020-Q4	64	173,000	58,906	58,908	2	-826.00	828.00
[illegible]400	1,013	2021-Q1	61	173,000	56,390	56,392	2	2.00	0.00
98,[illegible]0	1,013	2021-Q2	58	173,000	53,852	54,064	212	2.00	209.00
98,400	1,013	2021-Q3	55	173,000	51,290	51,496	206	211.00	-5.00
98,400	1,013	2021-Q4	52	173,000	48,706	48,905	199	205.00	-6.00
98,400	1,013	2022-Q1	49	173,000	46,098	46,289	192	315.00	-123.00
98,400	1,013	2022-Q2	46	173,000	43,466	43,650	184	184.00	0.00
98,400	1,013	2022-Q3	43	173,000	40,811	40,987	176	300.00	-124.00
98,400	1,013	2022-Q4	40	173,000	38,131	38,299	167	285.00	-117.00
98,400	1,013	2023-Q1	37	173,000	35,427	35,586	158	253.00	-94.00
98,400	1,013	2023-Q2	34	173,000	32,699	32,848	149	148.00	0.00
98,400	1,013	2023-Q3	31	173,000	29,946	30,085	139	236.00	-97.00
37,369	385	2023-Q4	28	173,000	10,319	27,296	16,978	138.00	16839.00
37,369	385	2024-Q1	25	173,000	9,254	24,547	15,293	17050.00	-1756.00
37,369	385	2024-Q2	22	173,000	8,180	21,699	13,520	15293.00	-1773.00
37,369	385	2024-Q3	19	173,000	7,096	18,826	11,730	13519.00	-1789.00
37,369	385	2024-Q4	16	173,000	6,002	15,925	9,923	11729.00	-1806.00

No change in Remainging Term!

Lower Monthly Payments!

Income has gone down! Possible Retiremment?

16k Prepaid!

Implied negative Prepayments from then on!

FROM FLOOD TO FIRE: IS PHYSICAL CLIMATE RISK TAKEN INTO ACCOUNT IN BANKS' RESIDENTIAL MORTGAGE RATES?

ADELE FONTANA & BENEDIKT SCHEID, EUROPEAN CENTRAL BANK

EUROPEAN CENTRAL BANK
EUROSYSTEM

EUROPEAN CENTRAL BANK
BANKING SUPERVISION

From Flood to Fire: Is physical climate risk taken into account in banks' residential mortgage rates?

January 2025

Adele Fontana, Barbara Jarmulska
Benedikt Scheid, Christopher Scheins
Claudia Schwarz

Disclaimer

This paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

[Please select]

Outline

1 Main Takeaways
2 Motivation & Research Questions
3 Data & Methodology
4 Results
5 Conclusion

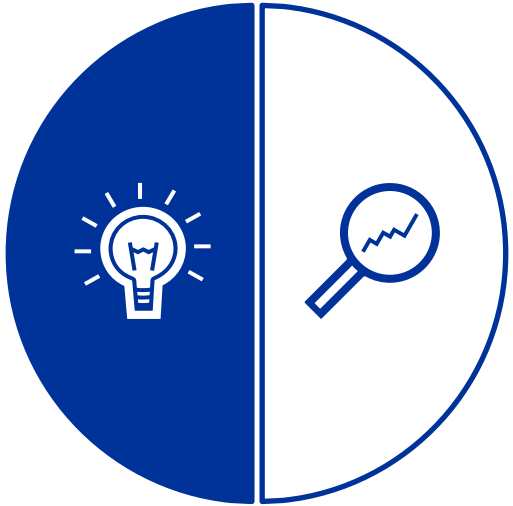
Main Takeaways

- Climate risks are financial risks
- Banks increasingly price physical climate risk into mortgage rates
- ECB supervision appears to influence bank behavior

Motivation & Research Questions

Motivation

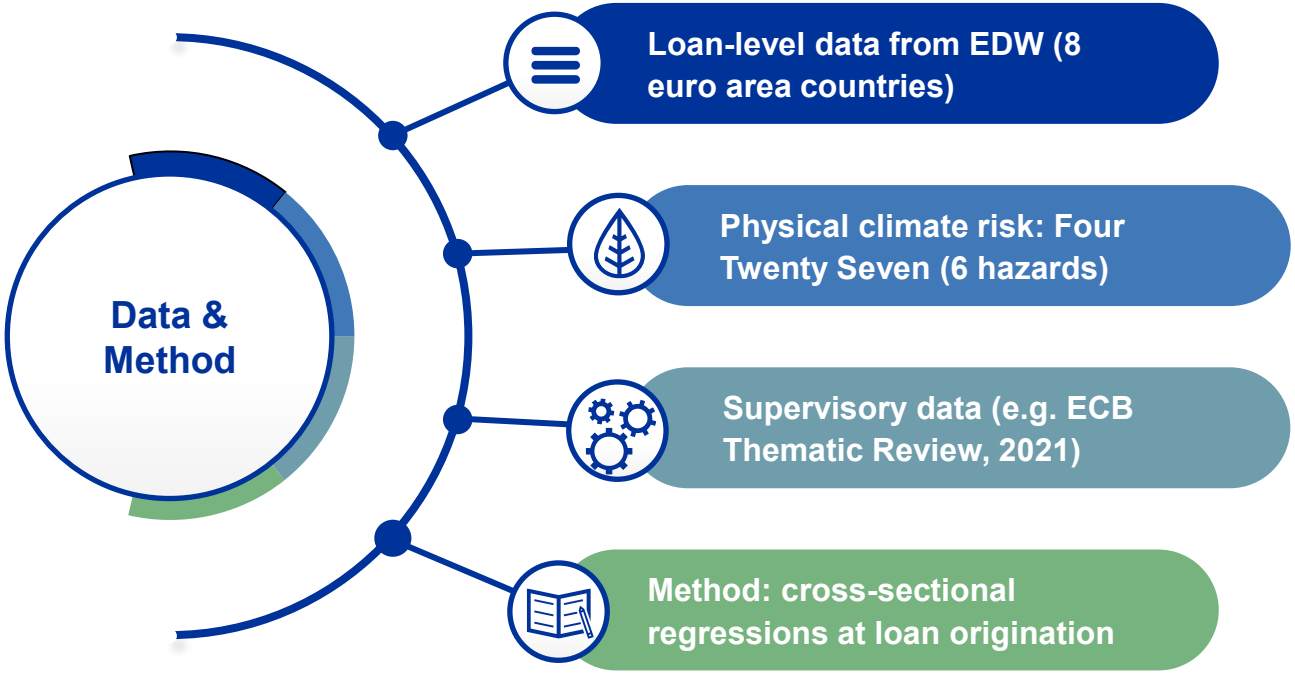
- Increasing **natural disasters** due to climate change
- **Real estate**: heavily exposed, systemic implications
- **Mortgage lending** is central to financial stability



Research questions

- Do banks incorporate physical **climate risk into mortgage rates**?
- Has pricing of climate risk changed **over time**?
- Are there **differences across banks**? What does this say about ECB's climate efforts?

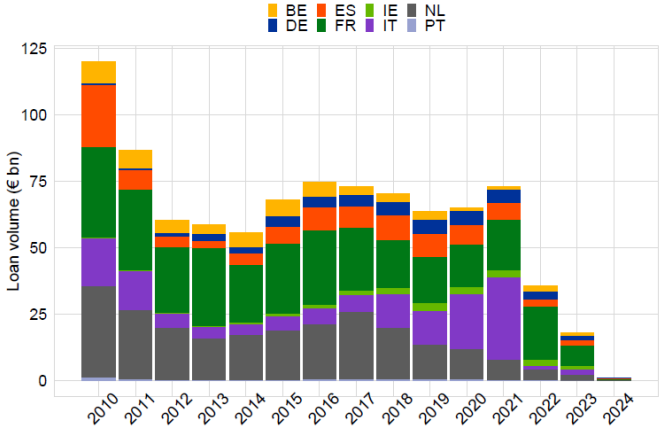
Data & Methodology



Data Deep-Dive (EDW)

- Loan-level information **at origination**
- **8 countries** – BE, DE, ES, FR, IE, IT, PT, NL
- **15 years** – 2010 - 2024
- **Relevant variables**
  - Mortgages interest rates
  - Borrower and loan characteristics
  - Location of property

Loan volumes per year/country

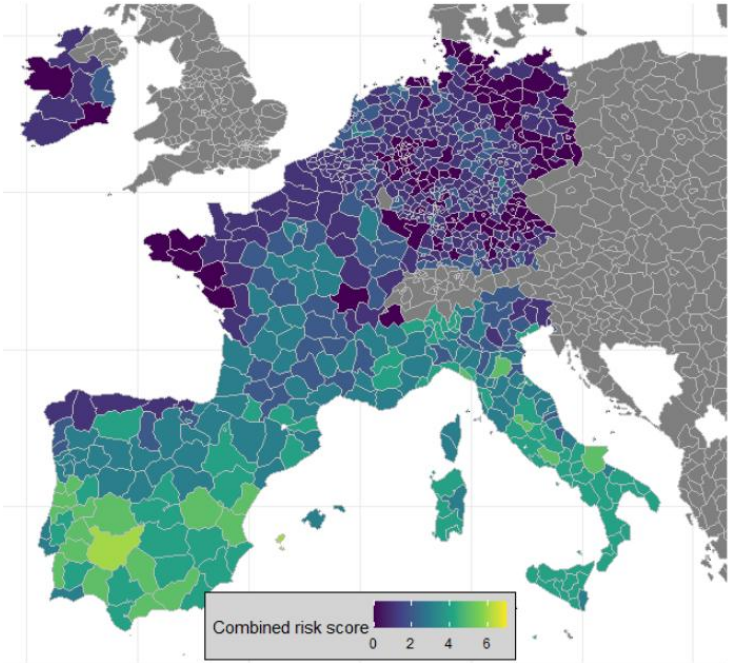


Descriptive statistics of EDW data

Country	Type	Minimum value	25% quantile	Average value	75% quantile	Maximum value	StdDev	Number of values
All	Interest Rate	0.00	1.41	2.29	3.09	9.75	1.21	6,084,990
All	Loan term (m)	0	204	272	360	480	91	6,084,990
All	OLTI	0.24	1.91	3.72	4.93	15.00	2.45	6,084,990
All	OLTV	0.00	0.58	0.76	0.98	3.00	0.30	6,084,990

Data Deep-Dive (EDW & 427)

Combined climate risk score by NUTS3 region



Source: 427, EDW and ECB calculations

- **427**
  - **6 hazards** – Floods, Heat Stress, Water Stress, Wildfire, Sea Level Rise and Windstorms
  - **Risk scores** – range from 0 (“No risk”) to 5 (“Red flag”)
  - **Building level** – indicators are granular but time-invariant
- **Merge with EDW:**
  - **Balance risk coverage** – recode risk scores to 0-3
  - **Combine hazards** into one metric (0-18)
  - Map climate risk indicator to the **finest available regional resolution** in EDW

Methodology

Pooled cross-sectional regressions on loan-level*

$$Y_i = \boldsymbol{\beta_1} \times Risk_r + X + \varepsilon$$

$$Y_i = \boldsymbol{\beta_2} \times Time \times Risk_r + \boldsymbol{\beta_3} \times Risk_r + X + \varepsilon$$

Where:

Y_i - **mortgage interest rate** at origination of loan *i*

$Time$ – dummies for **time**-periods (2010-2012; 2013-2015; 2016-2020 and 2021-2024)

$Risk_r$ - the **climate risk** score in region r

X- a set of **micro** (loan-level) and **macro control** variables

ε - the error term

$\boldsymbol{\beta_1}$ - captures the physical risk impact on mortgage interest rate

$\boldsymbol{\beta_2}$ + $\boldsymbol{\beta_3}$ - checks if the physical risk impact on mortgage rate is time varying

*Several robustness checks are conducted using bank characteristics as controls, along with additional controls and country-year fixed effects.

Results (1/2) – General Pricing

Rising risk premia:

- Higher **exposure to physical climate** risk tends to be associated with **higher interest rates**, and this effect gets **stronger over time**
  - ➢ Pricing increased post-Paris Agreement (2016)
- The findings are **robust to different specifications** of climate risk and a variety of controls and specifications

	Interest Rate (pct)			
	No controls (1)	Controls (2)	Subperiods (3)	Lender FE (4)
Climate risk	0.02***	0.02***	-0.08***	-0.09***
Climate risk × Loan issued (2013-2015)			0.11^{***}_{xxx}	0.11^{***}_{xx}
Climate risk × Loan issued (2016-2020)			0.18^{***}_{xxx}	0.17^{***}_{xxx}
Climate risk × Loan issued after 2021			0.19^{***}_{xxx}	0.19^{***}_{xxx}
Controls		✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.36626	0.44102	0.44694	0.54724
Observations	6,084,990	6,080,017	6,080,017	5,893,020
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI or Lender fixed effects				✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

Notes: Period of 2010-2012 is the baseline level in the regressions. Controls contain employment status, time to maturity of loan, LTV and DTI at origination and HH cost of borrowing (MIR). Standard errors are clustered by NUTS2 region.
SIs are Significant Institutions under supervision of the SSM.

Results (2/2) – Banks heterogeneity

- **ECB Efforts to Address Climate Risk in Banks**
  - Published **ECB Guide (Nov 2020)** and conducted **Thematic Review (TR)** on climate-related credit risk
  - TR scoring: Banks rated as **adequate**, **somewhat inadequate**, or **inadequate** in climate risk practices
- **Findings on Loan Pricing**
  - Banks rated “adequate" show **growing climate risk premia** post-Guide publication
  - Other banks show **little or no climate risk premia**, reflecting gaps in climate risk integration

	Interest Rate (pct)			
	All SIs	Adequate	s Inad	Inad
	(1)	(2)	(3)	(4)
Climate risk	-0.11*** (0.02)	-0.15*** (0.03)	-0.06*** (0.02)	-0.05 (0.04)
Climate risk × Loan issued (2013-2015)	0.12*** (0.02)	0.18*** (0.02)	0.05*** (0.02)	0.07* (0.04)
Climate risk × Loan issued (2016-2020)	0.19^{***}_{xxx} (0.02)	0.23^{***}_{xxx} (0.03)	0.12^{***}_{xxx} (0.03)	0.01_{xxx} (0.04)
Climate risk × Loan issued after 2021	0.22^{***}_{xxx} (0.04)	0.32^{***}_{xxx} (0.05)	0.10^{***}_{xxx} (0.03)	0.02_{xx} (0.04)
Controls	✓	✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.55503	0.62173	0.51912	0.53547
Observations	4,605,541	1,602,346	2,872,333	130,862
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI fixed effects	✓	✓	✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

Notes: The full sample is restricted to lenders that can be identified as belonging to the SI universe, i.e. no LSIs or other lenders are considered. Adequate in (2) refers to Adequate or broadly adequate
Period of 2010-2012 is the baseline level in the regressions. Controls contain employment status, time to maturity of loan, LTV and DTI at origination and HH cost of borrowing (MIR). Standard errors are clustered by NUTS2 region.

Conclusion

Physical climate risk is priced by euro area banks when extending mortgages, and the risk premium is increasing over time.

Banks assessed by the SSM as **adequately considering climate risk** in their credit activities charge **higher and rising risk premia**, especially post-publication of the ECB Guide.

Despite some limitations, the EDW dataset remains an **invaluable resource for empirical analysis.**

Thank you!

Q&A

Annex

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Reflecting on EDW Data

1. Data Limitations:

a) Only **55 out of 160+ variables** are mandatory for reporting, and non-mandatory information is often incomplete (e.g., borrower age, bank identifiers).
b) Borrower location data (e.g., NUTS3 codes or postal codes) is **pseudonymized**, reducing geographical resolution.
c) Imperfect matching of data based on ECB and ESMA templates
d) Data cleaning is required to address duplicates, outliers, and other inconsistencies.

2. Unique Cross-Country Mortgage Dataset:

a) The EDW dataset is the **only mortgage loan-level dataset for households** that covers multiple euro area countries.
b) It enables cross-country analysis of securitized loans, which is not possible with other datasets like AnaCredit (which does not include household data) or country-specific credit registers (which cannot be combined due to differences in methodologies and definitions).
c) Despite its limitations, the EDW dataset aligns well with other market data (Mortgage interest rates in EDW follow trends from official statistics).

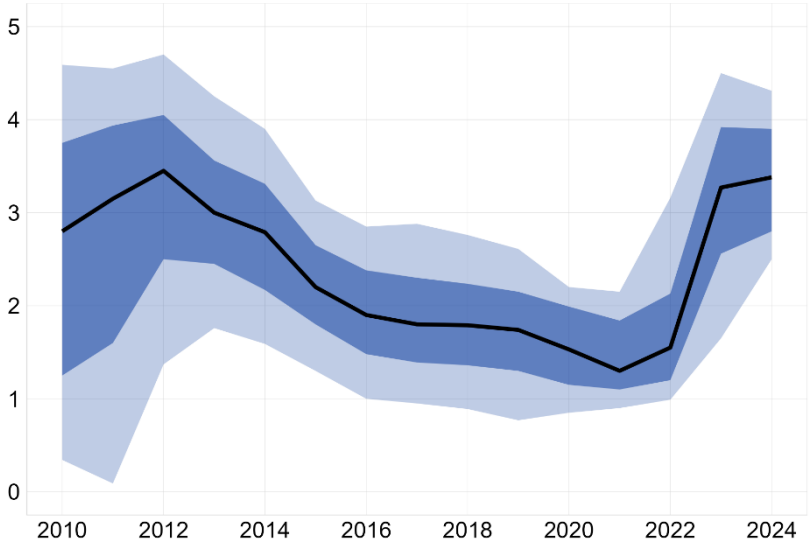
EDW representativeness

Our sample of EDW is limited in several ways:

- **Securitised loans –** loan-level data (LLD) submission required to be eligible as collateral at ECB
- **Declining coverage over time –** lower numbers of LLDs in 2023 & 2024
- **Subset of EA countries –** we opt to focus on 8 countries with sufficient data

→ **Is our sample still representative?**

Origination mortgage interest rates



Source: EDW and ECB calculations
Notes: Black line median. Darker shade 25-75th percentile range. Lighter shade 10-90th percentile range.

Robustness

The results are robust to

- Country-Year FE
- Different specifications of climate risk
- Omitted Variables (Oster 2017)
- Adding further controls
  - Macroeconomic
  - Bank characteristics
  - Size of statistical regions (km^2 and working age population)
- Focusing on separate hazards, besides heat stress and wildfires

Granularity of 427 & EDW Merge

RMBS Geolocation data availability in EDW

Country	Both available (%)	Neither (%)	Only NUTS3 (%)	Only postal code (%)
BE	76.7	0.0	1.5	21.8
DE	17.3	0.2	38.0	44.4
ES	84.2	0.8	10.0	5.0
FR	79.3	3.8	14.3	2.6
IE	32.7	0.1	49.2	18.0
IT	90.4	0.7	4.1	4.8
NL	82.8	0.1	9.4	7.7
PT	56.5	0.6	9.4	33.4

Source: EDW
Notes: Raw availability of EDW geolocation information. For most analysis, NUTS3 are filled based on zip codes if possible (i.e. for macroeconomic variables that are only available on NUTS3). The values are relative shares of all loans in EDW within the respective country.

Climate risk and loan pricing – literature

Do et al. (2021) show that US banks charge higher interest rates to borrowers located in drought-located areas

Javadi and Masum (2021) find empirical evidence that US firms in regions exposed to droughts pay significantly higher spreads on their bank loans: loan spreads of firms in the top quartile of climate risk exposure are about 4.4% larger than those of firms in the bottom quartile

Nguyen et al. (2022) show that US lenders charge higher interest rates for mortgages on residential real estate exposed to more sea level rise

Barbaglia et al. (2023) show that European banks charge higher interest rates on loans granted to small and medium-sized firms located in areas at high risk of flooding (by 6 basis points)

Risk Premium – Order of Magnitude

We follow Barbaglia et al. (2023) in computing the difference between the spread that should be charged for loans exposed to climate risk, and the spread for other loans, based on

$$S_{climate} = PD_c * LGD_c - PD_n * LGD_n$$

Where:

$S_{climate}$ - Risk premium related to climate physical risk

PD_n and LGD_n - PDs and LGDs of all loans, from the SSM Credit Underwriting project: 0.9% and 16%

PD_c - PDs of loans exposed to physical climate risk (PD_n* 3, odds ratio from Kousky et al. (2020))

LGD_c - LGDs of exposed loans (based on LGD_n and discount on property prices of 4.6% from Beltran (2018))

Based on stylized, backward looking assumptions a lower bound of the expected physical Climate Risk Premium would be **40 bp** (we are underestimating the effect as we compare to all loans and not only those not exposed to climate risk)

Climate risk already affects real estate markets

Climate risk is already affecting real estate valuation and banks' mortgage lending business, as some studies show:

- **Evidence of lenders accounting for flood risk in mortgage contracts** in Florida by adjusting Loan-to-Value ratios (LTV) but not interest rates (Sastry, 2022)
- **Significant valuation effects of physical risk:** Residential real estate prices fall by 18-30% in areas hit by climate change related natural events in Germany (Larkou, 2023)
- **Spillover effects:** following the occurrence of climate change related natural events, asking prices also fall in unaffected areas that are at high risk of the natural event (by 3-6%) and in unaffected, neighbouring areas (by 10-20%) (Larkou, 2023)
- **Valuation effects of mitigating physical risks:** The activation of the sea wall in Venice has increased house prices for properties exposed to flooding, for example properties on ground floors and those located in higher-ground areas (Benetton et al., 2022)

Insurance coverage

Average share of insured economic losses caused by natural catastrophe events in Europe

(1980-2023, percentage)

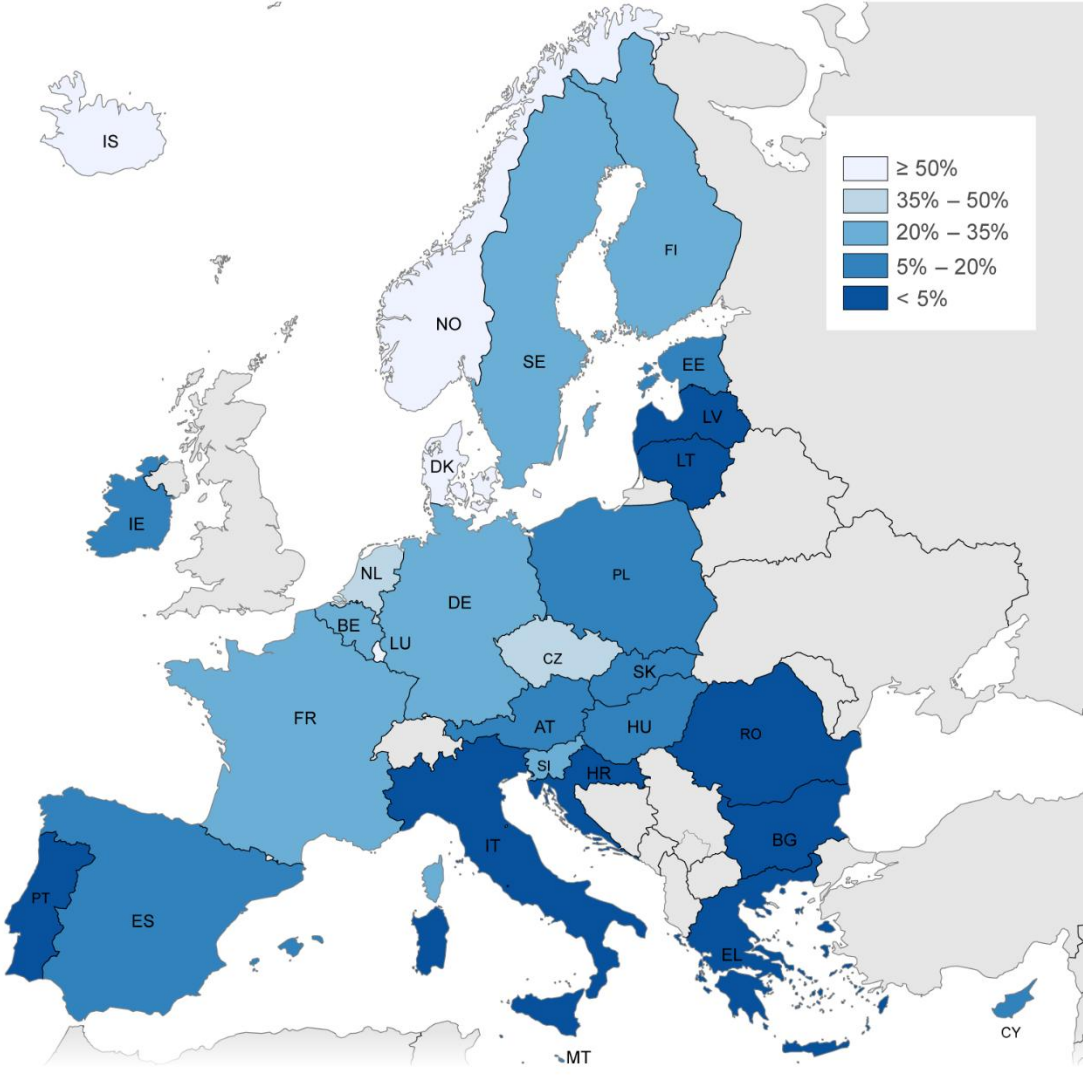


Figure 2: Loan volumes per year per country

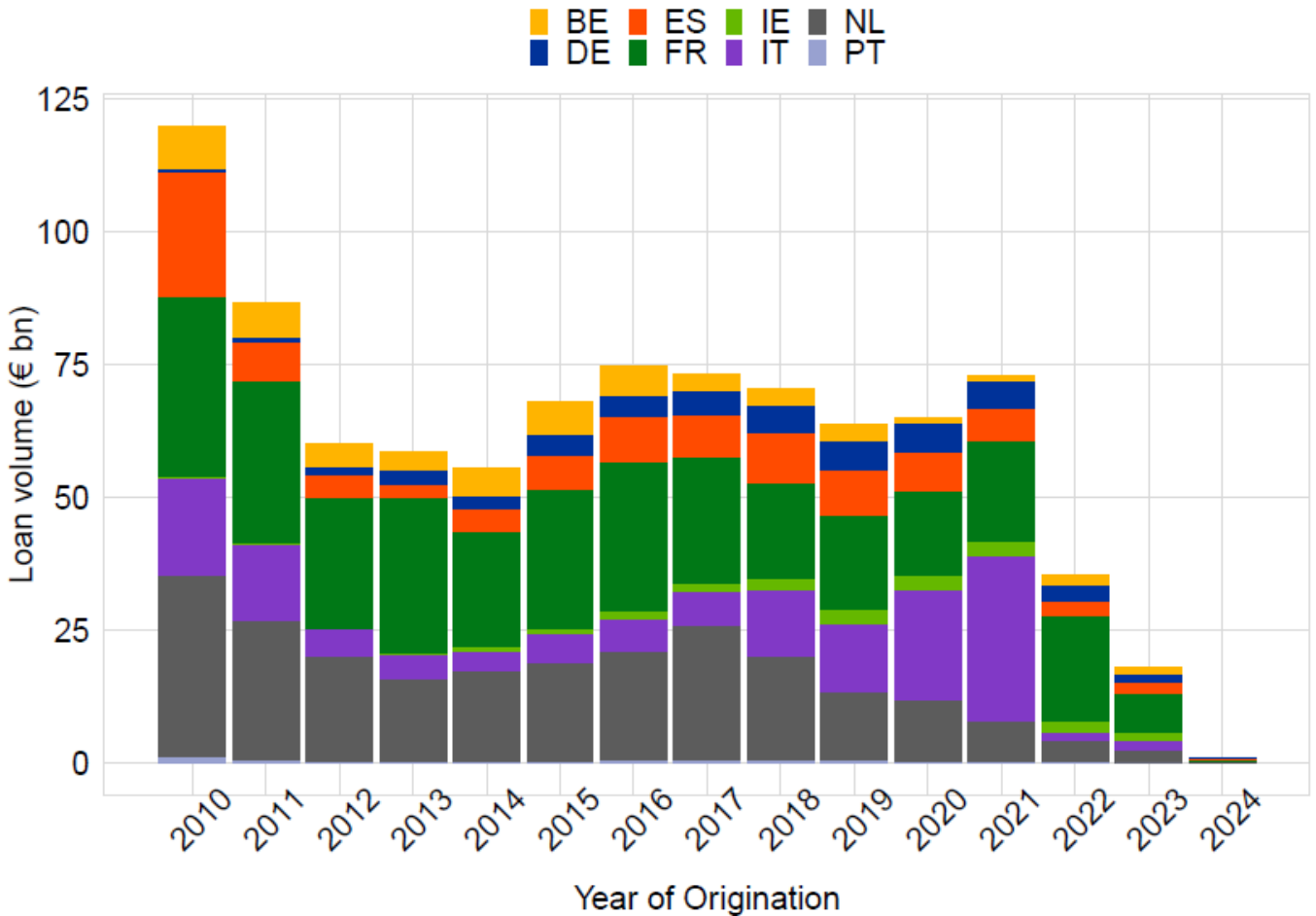


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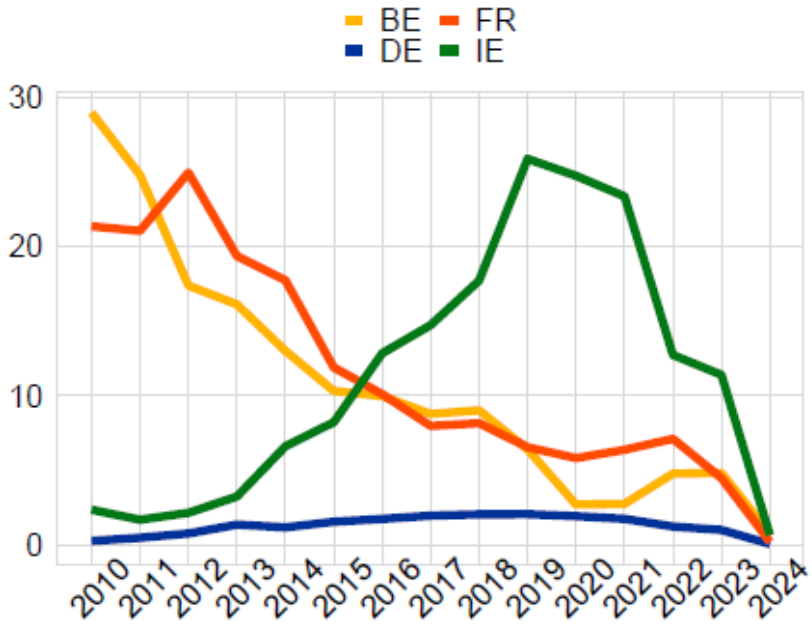
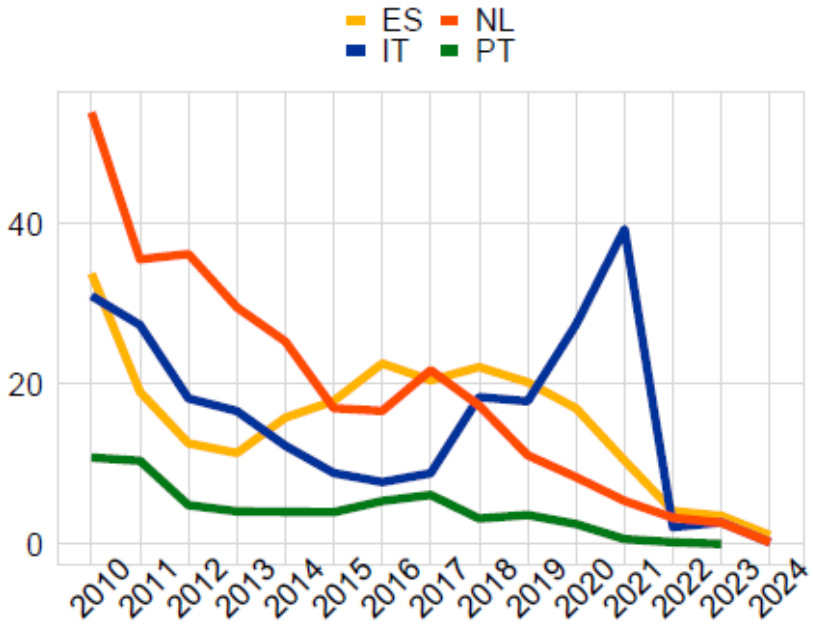
Figure 3: Shares of new loans covered per year per country





Source EDW and MIR

	Interest Rate (pct)			
	No controls	Controls	Subperiods	Lender FE
	(1)	(2)	(3)	(4)
Climate risk	0.03**	0.02**	-0.08***	-0.08***
Climate risk × Loan issued (2013-2015)			0.11^{***}_{xxx}	0.11^{***}_{xx}
Climate risk × Loan issued (2016-2020)			0.17^{***}_{xxx}	0.17^{***}_{xxx}
Climate risk × Loan issued after 2021			0.19^{***}_{xxx}	0.19^{***}_{xxx}
log(GDP per capita)	-0.16***	-0.16***	-0.14***	-0.13***
Controls		✓	✓	✓
Standard-Errors		NUTS2 region		
R^2	0.36779	0.44247	0.44820	0.54817
Observations	6,084,990	6,080,017	6,080,017	5,893,020
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI or Lender fixed effects				✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	Controls (1)	Controls incl bank controls (2)	Lender FE (3)	Lender FE incl bank controls (4)
Climate risk	-0.12***	-0.12***	-0.10***	-0.10***
Climate risk × Loan issued (2013-2015)	0.13***	0.13***	0.11***	0.10***
Climate risk × Loan issued (2016-2020)	0.21^{***}_{xxx}	0.21^{***}_{xxx}	0.17^{***}_{xxx}	0.18^{***}_{xxx}
Climate risk × Loan issued after 2021	0.25^{***}_{xxx}	0.25^{***}_{xxx}	0.22^{***}_{xxx}	0.21^{***}_{xxx}
CET1 Ratio		-0.12		1.41
RoE (after tax)		-0.37		-0.15
Net Interest Margin		-3.03		-1.27
NPL/Total loans		1.36		1.18
Controls	✓	✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.50774	0.50857	0.54866	0.54901
Observations	4,680,241	4,680,241	4,680,241	4,680,241
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI or Lender fixed effects			✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	All SIs	Adequate	s Inad	Inad
	(1)	(2)	(3)	(4)
Climate risk	-0.11***	-0.15***	-0.05***	-0.05
Climate risk × Loan issued (2013-2015)	0.12***	0.18^{***}_{xx}	0.05**	0.07*
Climate risk × Loan issued (2016-2020)	0.19^{***}_{xxx}	0.24^{***}_{xxx}	0.10^{***}_{xxx}	0.02_{xxx}
Climate risk × Loan issued after 2021	0.22^{***}_{xxx}	0.23^{***}_{xxx}	0.12^{***}_{xx}	0.02_{x}
CET1 Ratio	1.69*	-2.35***	9.04***	-2.57***
RoE (after tax)	-0.16	0.02	1.07**	1.43***
Net Interest Margin	-1.03	-3.23*	-0.07	2.91***
NPL/Total loans	1.16	1.28	-2.26***	-1.60
Controls	✓	✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.55539	0.62167	0.52096	0.53607
Observations	4,605,541	1,602,346	2,872,333	130,862
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI fixed effects	✓	✓	✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

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	Interest Rate (pct)					
	Flood	Heat Stress	Sea Level Rise	Water Stress	Wildfire	Windstorms
	(1)	(2)	(3)	(4)	(5)	(6)
Hazard Risk score	0.03***	-0.04	0.06***	0.05***	0.03	0.59***
Controls	✓	✓	✓	✓	✓	✓
Standard-Errors	NUTS2 region					
R^2	0.44085	0.44087	0.44078	0.44115	0.44084	0.44073
Observations	6,080,017	6,080,017	6,080,017	6,080,017	6,080,017	6,080,017
Country fixed effects	✓	✓	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓	✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	No controls (1)	Controls (2)	Subperiods (3)	Lender FE (4)
Dynamic Climate risk	0.02*	0.02**	-0.14***	-0.15***
Dynamic Climate risk × Loan issued (2013-2015)			0.17^{***}_{xxx}	0.18^{***}_{x}
Dynamic Climate risk × Loan issued (2016-2020)			0.23^{***}_{xxx}	0.24^{***}_{xxx}
Dynamic Climate risk × Loan issued after 2021			0.25^{***}_{xxx}	0.26^{***}_{xxx}
Controls		✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.36612	0.44099	0.44908	0.54960
Observations	6,084,990	6,080,017	6,080,017	5,893,020
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI or Lender fixed effects				✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	All SIs	Adequate	s Inad	Inad
	(1)	(2)	(3)	(4)
Dynamic Climate risk	-0.20***	-0.21***	-0.15***	-0.05
Dynamic Climate risk × Loan issued (2013-2015)	0.20***	0.23***	0.13***	0.07*
Dynamic Climate risk × Loan issued (2016-2020)	0.28^{***}_{xxx}	0.30^{***}_{xxx}	0.21^{***}_{xxx}	0.01_{xxx}
Dynamic Climate risk × Loan issued after 2021	0.31^{***}_{xxx}	0.30^{***}_{xxx}	0.23^{***}_{xx}	0.02_{x}
Controls	✓	✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.55783	0.62221	0.52203	0.53542
Observations	4,605,541	1,602,346	2,872,333	130,862
Country fixed effects	✓	✓	✓	✓
Year of origination fixed effects	✓	✓	✓	✓
SI fixed effects	✓	✓	✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	No controls (1)	Controls (2)	Subperiods (3)	Lender FE (4)
Dynamic Climate risk	0.02***	0.02**	0.04**	0.03***
Dynamic Climate risk × Loan issued (2013-2015)			0.00_{xxx}	-0.01_{xxx}
Dynamic Climate risk × Loan issued (2016-2020)			-0.03	-0.02*
Dynamic Climate risk × Loan issued after 2021			-0.02	-0.04*
Controls		✓	✓	✓
Standard-Errors		NUTS2 region		
R^2	0.55924	0.48330	0.48337	0.57864
Observations	5,897,993	6,080,017	6,080,017	5,893,020
Country-Year of origination fixed effects	✓	✓	✓	✓
SI or Lender fixed effects	✓			✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

	Interest Rate (pct)			
	All SIs	Adequate	s Inad	Inad
	(1)	(2)	(3)	(4)
Dynamic Climate risk	0.02	0.04**	0.00	-0.05
Dynamic Climate risk × Loan issued (2013-2015)	0.01_{xxx}	-0.01_{x}	0.01	0.06
Dynamic Climate risk × Loan issued (2016-2020)	-0.01	-0.04	0.01	0.01_{xxx}
Dynamic Climate risk × Loan issued after 2021	-0.02	-0.06**	0.00	0.02_{x}
Controls	✓	✓	✓	✓
Standard-Errors	NUTS2 region			
R^2	0.59045	0.65424	0.54446	0.54885
Observations	4,605,541	1,602,346	2,872,333	130,862
Country-Year of origination fixed effects	✓	✓	✓	✓
SI fixed effects	✓	✓	✓	✓

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Joint-Signif. Codes: xxx: 0.01, xx: 0.05, x: 0.1

THANK YOU

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