EUROPEAN
DATAWAREHOUSE

RESEARCH UPDATE

Q4 2025

DECEMBER 2025

WELCOMING REMARKS

ON TODAY'S CALL

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AGENDA

WELCOMING REMARKS
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

EDW RESEARCH PUBLICATIONS
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

EBE UPDATE
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

EDW AGGREGATE DATA
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

ALL IN ONE DB UPDATE
LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

GAS UPDATE
USMAN JAMIL, EUROPEAN DATAWAREHOUSE

ENGAGE PROJECT ON MORTGAGE AND ENERGY EFFICIENCY
MICHELE COSTOLA, UNIVERSITÀ CA' FOSCARI VENEZIA

ASSESSING AI USE FOR CAR FUEL CLASSIFICATION
INA KRAPP, LEIBNIZ INSTITUTE FOR FINANCIAL RESEARCH SAFE E.V.

UPCOMING EVENTS

Events - European DataWarehouse

Regulatory Roundtable: Updates and Outlook @ 15:00 CET

2026 French Securitisation Event – Paris

UPCOMING EVENTS: H1 2026

UPCOMING EVENTS: H1 2026

Invitation to the
Banque de France ABS Seminar
Banque de France Conference Center, 9 January 2026
(31 rue Croix-des-Petits-Champs, Paris)

8:30 - 12:40
Focus on Recent Trends in the ABS industry

8:30	Registration and Welcome
9:00	Introduction by Denis BEAU (Banque de France - Sous-Gouverneur)
9:15	Part I: **ABS as monetary policy asset** (Banque de France)
10:00	Part II: **Trends in the ABS market** (Banque de France and Société Générale)
10:45	**Coffee Break**
11:15	Part III: **Revision of the securitisation regulation** (Panel) Moderator François Haas (Banque de France – Deputy DG Financial Stability and Operations) Speakers [to be confirmed] – Private and Public sector entities
12:30	**Conclusion** by François Haas
12:40	**Lunch Break - BdF premises**

UPCOMING EVENTS: H1 2026

14:30 - 17:00
Workshop with EDW

14:30 **Introduction - European DataWarehouse workshop**
14:35 **European DataWarehouse data quality**
14:55 **Data quality and the rating process** (Moody's)
15:10 **European DataWarehouse new solutions**

15:20 **Coffee break**

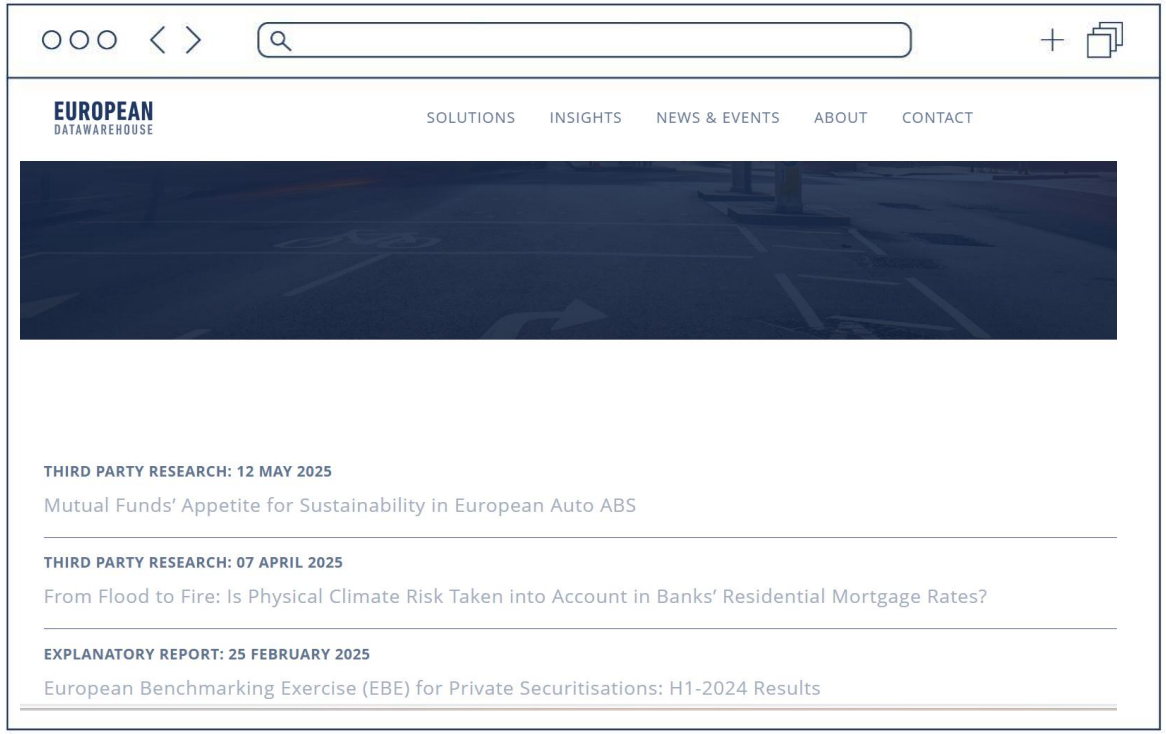
15:40 **ESMA templates and climate fields** (Banque de France)
15:55 **European DataWarehouse research update**
16:05 **Green Auto Securitisation (GAS) project**
16:15 **ENGAGE for ESG initiative**
16:30 **Q & A session and Closing remarks**

17:00
End of the day

EDW RESEARCH PUBLICATIONS

RESEARCH SECTION

THIRD PARTY PUBLICATIONS USING OUR DATA: HTTPS://EURODW.EU/KNOWLEDGE/RESEARCH/

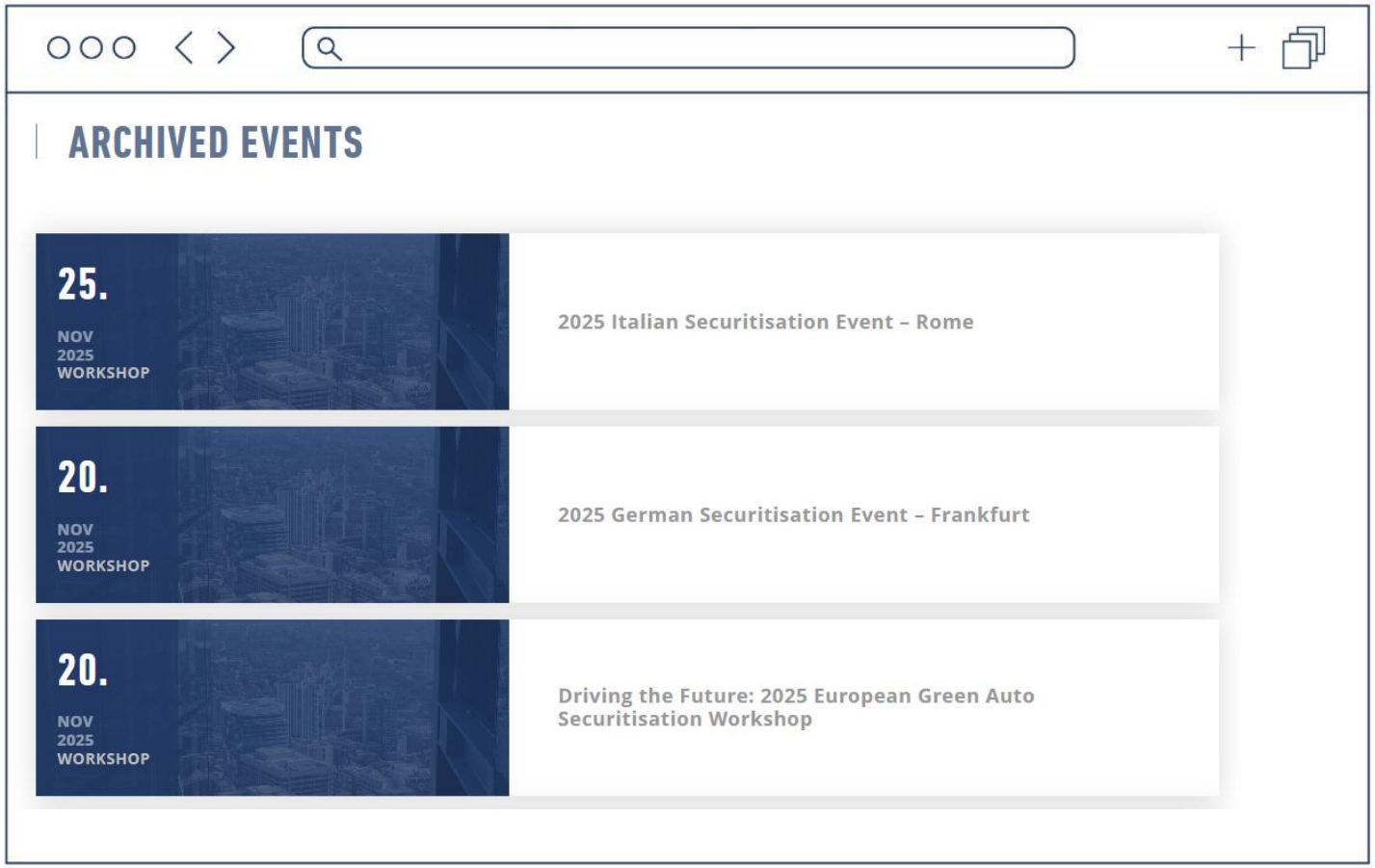


Latest publications

- **A Standardised Methodology to Calculate Vehicle Emissions with CO2** (GAS-related publication)
- **European Benchmarking Exercise (EBE) for Private Securitisations: H1-2025 Results**

ARCHIVED EVENTS

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

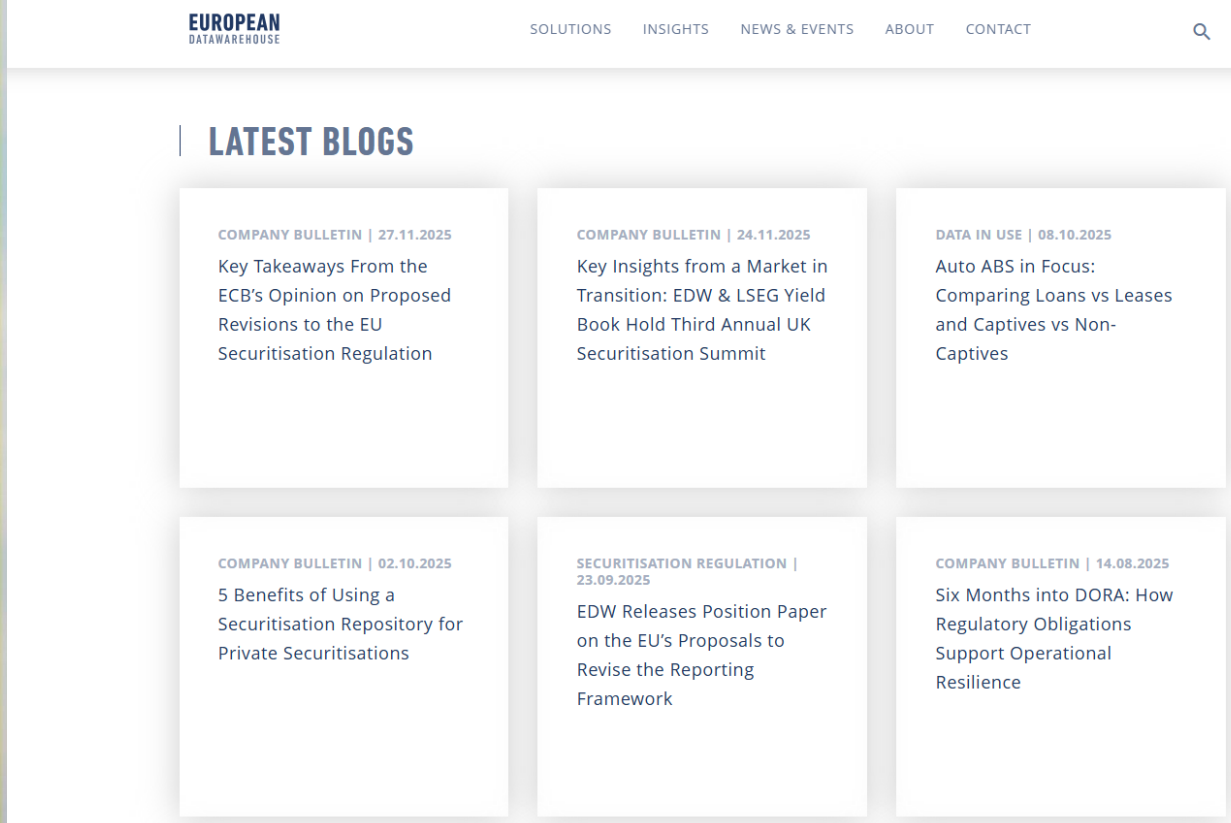


German securitisation event

- Download the slides of the 20 November 2025 German Securitisation Event **HERE**

BLOG

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



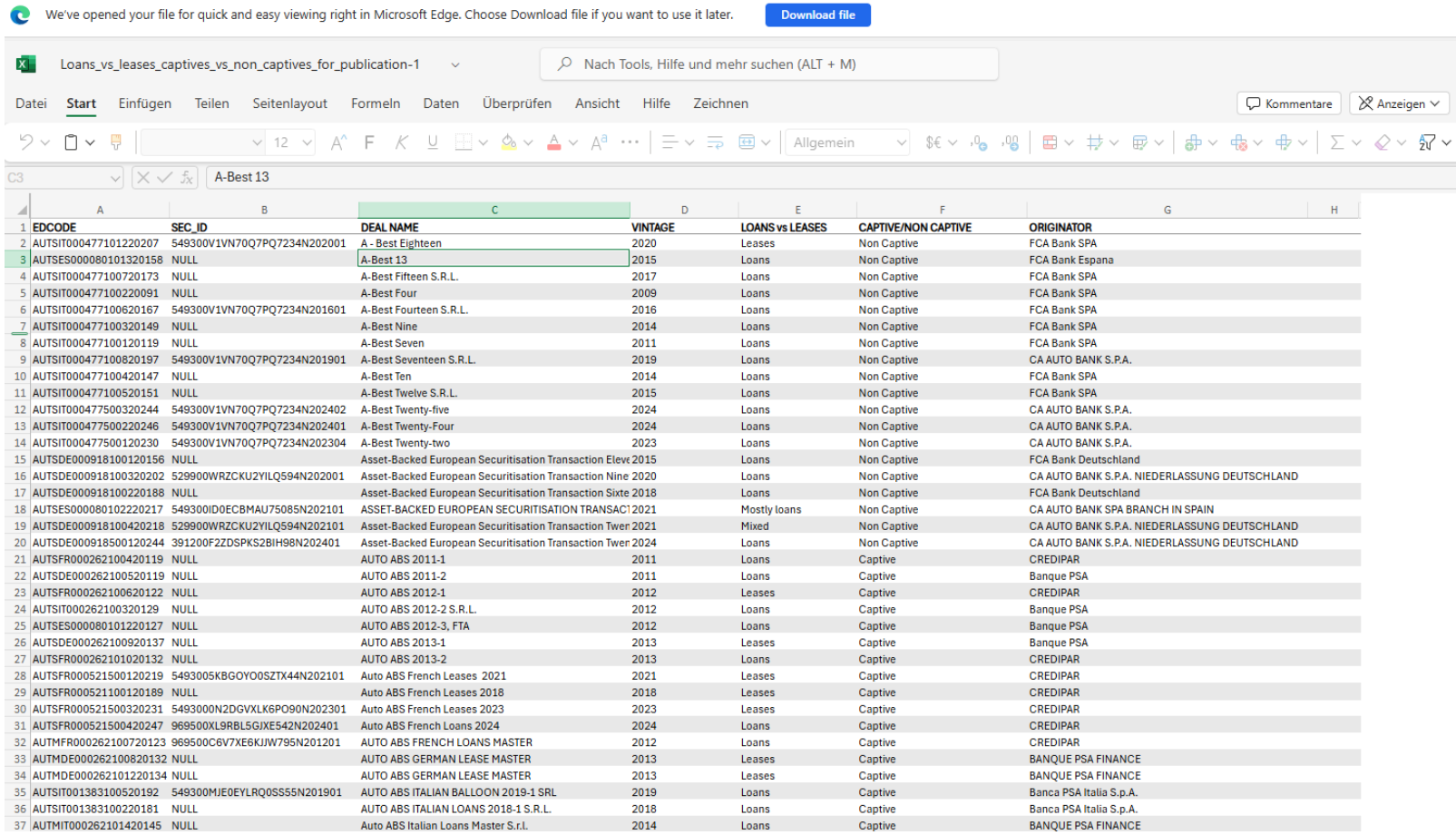
Latest publications

- **Auto ABS in Focus: Comparing Loans vs Leases and Captives Non-Captives**

The analysis explored how these distinctions affect performance across European markets and led to the publication of a comprehensive classification list of auto ABS transactions — available for **DOWNLOAD HERE.**

BLOG

AUTO ABS IN FOCUS: EXCEL LIST ONLINE MENTIONING LEASES VS NON-LEASES AND CAPTIVES VS NON-CAPTIVES



We've opened your file for quick and easy viewing right in Microsoft Edge. Choose Download file if you want to use it later. Download file

Loans_vs_leases_captives_vs_non_captives_for_publication-1

Nach Tools, Hilfe und mehr suchen (ALT + M)

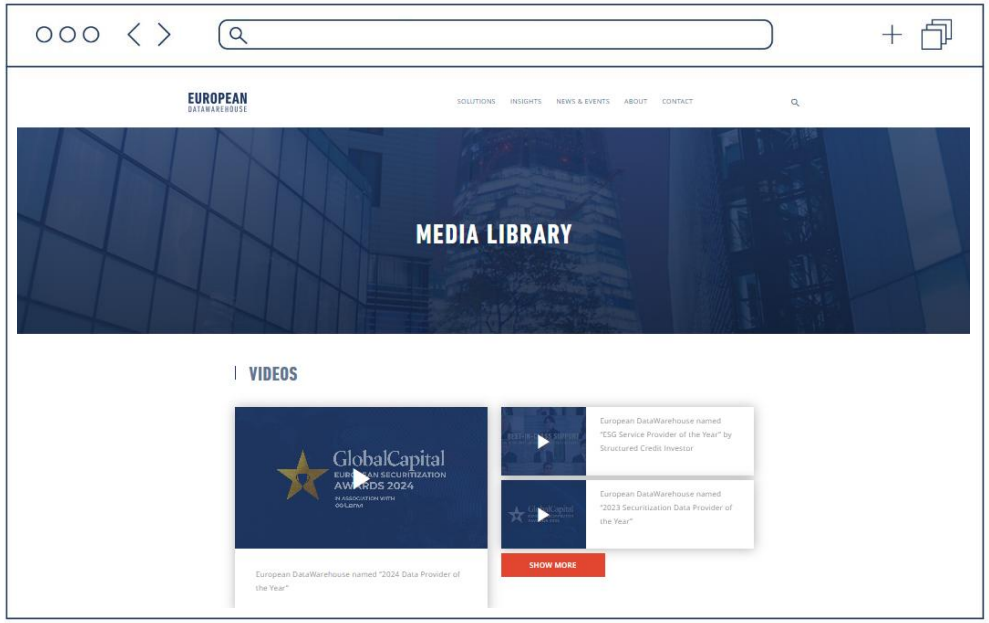
Datei Start Einfügen Teilen Seitenlayout Formeln Daten Überprüfen Ansicht Hilfe Zeichnen Kommentare Anzeigen

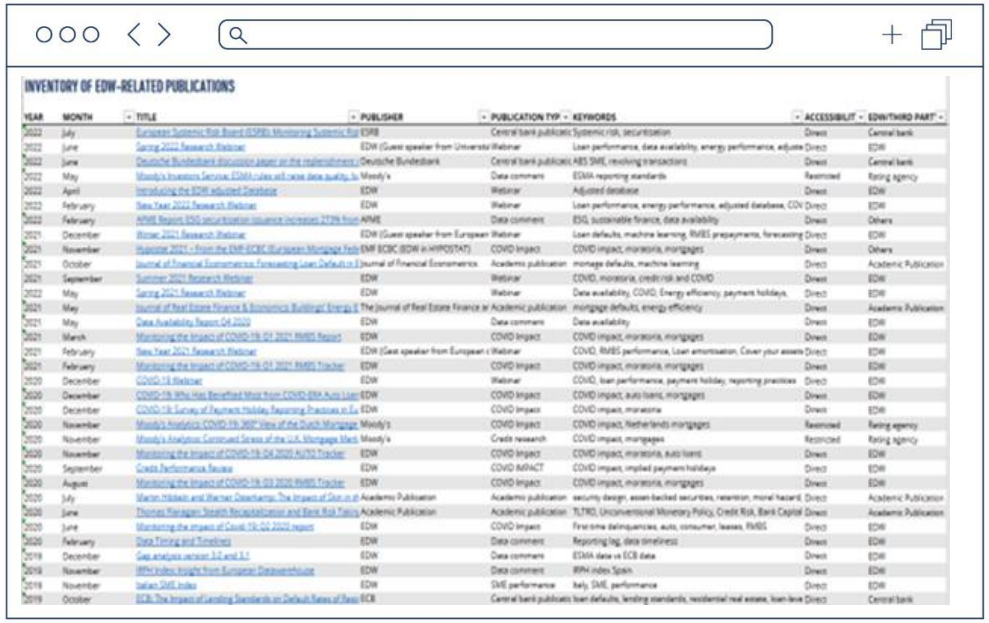
C3 A-Best 13

	A	B	C	D	E	F	G	H
1	EDCODE	SEC_ID	DEAL NAME	VINTAGE	LOANS vs LEASES	CAPTIVE/NON CAPTIVE	ORIGINATOR	
2	AUTSIT000477101220207	549300V1VN70Q7PQ7234N202001	A - Best Eighteen	2020	Leases	Non Captive	FCA Bank SPA	
3	AUTSES000080101320158	NULL	A-Best 13	2015	Loans	Non Captive	FCA Bank Espana	
4	AUTSIT000477100720173	NULL	A-Best Fifteen S.R.L.	2017	Loans	Non Captive	FCA Bank SPA	
5	AUTSIT000477100220091	NULL	A-Best Four	2009	Loans	Non Captive	FCA Bank SPA	
6	AUTSIT000477100620167	549300V1VN70Q7PQ7234N201601	A-Best Fourteen S.R.L.	2016	Loans	Non Captive	FCA Bank SPA	
7	AUTSIT000477100320149	NULL	A-Best Nine	2014	Loans	Non Captive	FCA Bank SPA	
8	AUTSIT000477100120119	NULL	A-Best Seven	2011	Loans	Non Captive	FCA Bank SPA	
9	AUTSIT000477100820197	549300V1VN70Q7PQ7234N201901	A-Best Seventeen S.R.L.	2019	Loans	Non Captive	CA AUTO BANK S.P.A.	
10	AUTSIT000477100420147	NULL	A-Best Ten	2014	Loans	Non Captive	FCA Bank SPA	
11	AUTSIT000477100520151	NULL	A-Best Twelve S.R.L.	2015	Loans	Non Captive	FCA Bank SPA	
12	AUTSIT000477500320244	549300V1VN70Q7PQ7234N202402	A-Best Twenty-five	2024	Loans	Non Captive	CA AUTO BANK S.P.A.	
13	AUTSIT000477500220246	549300V1VN70Q7PQ7234N202401	A-Best Twenty-Four	2024	Loans	Non Captive	CA AUTO BANK S.P.A.	
14	AUTSIT000477500120230	549300V1VN70Q7PQ7234N202304	A-Best Twenty-two	2023	Loans	Non Captive	CA AUTO BANK S.P.A.	
15	AUTSDE000918100120156	NULL	Asset-Backed European Securitisation Transaction Eleve	2015	Loans	Non Captive	FCA Bank Deutschland	
16	AUTSDE000918100320202	529900WRZCKU2YILQ594N202001	Asset-Backed European Securitisation Transaction Nine	2020	Loans	Non Captive	CA AUTO BANK S.P.A. NIEDERLASSUNG DEUTSCHLAND	
17	AUTSDE000918100220188	NULL	Asset-Backed European Securitisation Transaction Sixte	2018	Loans	Non Captive	FCA Bank Deutschland	
18	AUTSES000080102220217	549300ID0ECBMAU75085N202101	ASSET-BACKED EUROPEAN SECURITISATION TRANSAC1	2021	Mostly loans	Non Captive	CA AUTO BANK SPA BRANCH IN SPAIN	
19	AUTSDE000918100420218	529900WRZCKU2YILQ594N202101	Asset-Backed European Securitisation Transaction Twer	2021	Mixed	Non Captive	CA AUTO BANK S.P.A. NIEDERLASSUNG DEUTSCHLAND	
20	AUTSDE000918500120244	391200F2ZDSPKS2BIH98N202401	Asset-Backed European Securitisation Transaction Twer	2024	Loans	Non Captive	CA AUTO BANK S.P.A. NIEDERLASSUNG DEUTSCHLAND	
21	AUTSFR000262100420119	NULL	AUTO ABS 2011-1	2011	Loans	Captive	CREDIPAR	
22	AUTSDE000262100520119	NULL	AUTO ABS 2011-2	2011	Loans	Captive	Banque PSA	
23	AUTSFR000262100620122	NULL	AUTO ABS 2012-1	2012	Leases	Captive	CREDIPAR	
24	AUTSIT000262100320129	NULL	AUTO ABS 2012-2 S.R.L.	2012	Loans	Captive	Banque PSA	
25	AUTSES000080101220127	NULL	AUTO ABS 2012-3, FTA	2012	Loans	Captive	Banque PSA	
26	AUTSDE000262100920137	NULL	AUTO ABS 2013-1	2013	Leases	Captive	Banque PSA	
27	AUTSFR000262101020132	NULL	AUTO ABS 2013-2	2013	Loans	Captive	CREDIPAR	
28	AUTSFR000521500120219	5493005KBGOYO0SZTX44N202101	Auto ABS French Leases 2021	2021	Leases	Captive	CREDIPAR	
29	AUTSFR000521100120189	NULL	Auto ABS French Leases 2018	2018	Leases	Captive	CREDIPAR	
30	AUTSFR000521500320231	5493000N2DGVXLK6PO90N202301	Auto ABS French Leases 2023	2023	Leases	Captive	CREDIPAR	
31	AUTSFR000521500420247	969500XL9RBL5GJXE542N202401	Auto ABS French Loans 2024	2024	Loans	Captive	CREDIPAR	
32	AUTMFR000262100720123	969500C6V7XE6KJJW795N201201	AUTO ABS FRENCH LOANS MASTER	2012	Loans	Captive	CREDIPAR	
33	AUTMDE000262100820132	NULL	AUTO ABS GERMAN LEASE MASTER	2013	Leases	Captive	BANQUE PSA FINANCE	
34	AUTMDE000262101220134	NULL	AUTO ABS GERMAN LEASE MASTER	2013	Leases	Captive	BANQUE PSA FINANCE	
35	AUTSIT001383100520192	549300MJE0EYLRQ0SS55N201901	AUTO ABS ITALIAN BALLOON 2019-1 SRL	2019	Loans	Captive	Banca PSA Italia S.p.A.	
36	AUTSIT001383100220181	NULL	AUTO ABS ITALIAN LOANS 2018-1 S.R.L.	2018	Loans	Captive	Banca PSA Italia S.p.A.	
37	AUTMIT000262101420145	NULL	Auto ABS Italian Loans Master S.r.l.	2014	Loans	Captive	BANQUE PSA FINANCE	

LIST OF RESEARCH PUBLICATIONS

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





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	Hypostat 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
2021	March	Monitoring the Impact of COVID-19: Q1 2021 RMBS Report	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct
2021	February	New Year 2021 Research Webinar	EDW (Gest speaker from European c	Webinar	COVID, RMBS performance, Loan amortisation, Cover your assets	Direct
2021	February	Monitoring the Impact of COVID-19: Q1 2021 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct
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
2020	February	Data Timing and Timeliness	EDW	Data comment	Reporting lag, data timeliness	Direct
2019	December	Gap analysis version 3.0 and 3.1	EDW	Data comment	ESMA data vs ECB data	Direct
2019	November	IRPH Index: Insight from European Datawarehouse	EDW	Data comment	IRPH index Spain	Direct
2019	November	Italian SME Index	EDW	SME performance	Italy, SME, performance	Direct
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 (2019 - Q1(Excel)	EDW	Data comment	Data availability, ABS, SME, RMBS, Auto, Leases, Consumer	Direct

EUROPEAN BENCHMARKING EXERCISE

EBE POWERPOINT-PRESENTATION

EUROPEAN BENCHMARKING EXERCISE UPDATE

RECENT PUBLICATIONS: H1-2025 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS COAUTHORED BY EDW, AFME AND TSI

- The report provides **aggregated transaction-level data** from **12 banks** across **6 European countries** on a voluntary basis.
- Its purpose is to enhance the quality and usefulness of disclosure in the private cash securitisation market, both ABCP and balance-sheet financed in the EU and the UK.
- Scope of the study:
  - NOT private CLOs (collateralised Loan Obligations)
  - NOT private NPL (nonperforming loans)
  - NOT synthetic SRT deals (significant risk transfer)
- Private ABS only (most of which are used for ABCP collateral)

RECENT PUBLICATIONS: H1-2025 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS HIGHLIGHTS

Key highlights

- Private securitisations backed by trade receivables and auto loans/leases make up around **73%** of the market, and if consumer loans and equipment leasing are included, the 4 asset classes together represent **87%** of the market.
- Private securitisation markets are a key source of financing for the real economy.
- The difference between the €82.6 billion of commitments and the €226.5 billion total assets size is because:
  - Many large private securitisations are syndicated, with several commitments from several banks
  - If one of the 12 reporting banks in the EBE reports a commitment of €100million for a deal with €2 billion in assets which none of the other 11 banks report, this will account for €100 million out of the €82.6 billion of commitments outstanding and for €2 billion in the €226.5 billion of total assets.
- The overall private securitisation market is currently estimated at €256.7bn of total market (inferred from the asset size of €226.5 billion, the credit enhancement and the asset utilisation rate)

RECENT PUBLICATIONS: H1-2025 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS CO-AUTHORED BY EDW, AFME AND TSI

Table 1 – Overview

		2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_p
Number of Participants	#	12	12	12	12	12	12	12	12	12	0.0%
Number of Commitments	#	631	637	595	610	610	556	525	527	504	-0.9%
Number of Transactions	#	465	453	435	457	443	433	412	387	404	2.6%
Committed Amount	Million EUR	82,630	86,841	79,288	79,424	78,590	73,182	67,241	65,064	62,814	-4.8%
Funded Amount	Million EUR	64,181	64,112	60,197	59,111	57,748	60,502	56,400	53,009	50,205	0.1%
Utilisation	%	77.7%	73.8%	75.9%	74.4%	73.5%	82.7%	83.9%	81.5%	80.0%	5.2%
Total Asset Amount	Million EUR	226,516	220,265	207,646	203,859	195,524	184,159	183,326	173,016	177,329	2.8%
Based on delivered data:											
Estimated Market Size	Million EUR	256,718	249,634	232,236	231,040	209,400	195,669	194,784	183,830	188,412	2.8%

Δ_p=growth in last period

Table 4 – Asset Type (Committed Amounts)

	2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_p
Trade Receivables	46,059	50,904	45,684	46,784	47,505	42,523	40,682	38,966	35,689	-10%
Auto Loan or Leasing	13,879	12,918	13,075	11,986	11,023	11,132	10,162	11,187	13,985	7%
Equipment Leasing	6,873	6,692	6,130	5,598	4,830	5,096	4,327	4,183	3,417	3%
Consumer Loans	5,383	5,087	4,879	5,580	5,115	4,891	4,704	3,760	3,197	6%
Diverse	10,437	11,238	9,520	9,476	10,117	9,540	7,366	6,968	6,527	-7%
Total	**82,630**	**86,841**	**79,288**	**79,424**	**78,590**	**73,182**	**67,241**	**65,064**	**62,815**	**-5%**

Δ_p=growth in last period

RECENT PUBLICATIONS: H1-2024 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS HIGHLIGHTS

Mostly ABCP, mostly STS…

- 85% of the volume is ABCP funded, 64% of the transactions have the STS label…

Table 2 – Funding Type (Committed Amount)

	2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_p
ABCP	70,070	74,922	68,889	69,833	69,635	65,235	59,412	57,491	55,524	-6%
BS	12,559	11,919	10,399	9,591	8,954	7,947	7,829	7,573	7,291	5%
Total	**82,630**	**86,841**	**79,288**	**79,424**	**78,590**	**73,182**	**67,241**	**65,064**	**62,815**	**-5%**

Δ_p=growth in last period

Table 3 – Evolution of STS share (Committed Amount)

	2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_p
STS share (in % by Committed Amount)	63.8%	61.6%	63.2%	61.2%	58.6%	56.6%	56.7%	55.0%	ND	4%
Committed Amounts	52,706	53,521	50,084	48,571	46,090	41,452	38,140	35,784	ND	-2%
No. of STS commitments	397	387	371	366	356	305	275	256	ND	3%

Δ_p=growth in last period

RECENT PUBLICATIONS: H1-2024 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS HIGHLIGHTS

Transaction ratings

- 82%+ of transaction ratings are above or equal to A

Table 13 – Transaction Rating Distribution

	2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_{12}
AAA	29.2%	27.6%	30.3%	26.3%	29.0%	22.3%	22.6%	22.4%	20.2%	6%
AA	38.2%	34.9%	35.6%	36.2%	34.0%	35.2%	39.8%	38.8%	34.3%	9%
A	14.4%	19.1%	16.5%	20.4%	19.6%	25.9%	21.9%	23.9%	21.0%	-24%
BBB	11.7%	11.7%	11.0%	11.2%	12.3%	11.4%	11.1%	10.0%	9.6%	0%
BB and lower	0.3%	0.3%	0.2%	0.2%	0.3%	0.4%	0.5%	0.4%	0.5%	6%
Undisclosed	6.1%	6.4%	6.3%	5.6%	4.7%	4.9%	4.1%	4.6%	14.4%	-4%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	

RECENT PUBLICATIONS: H1-2025 EBE REPORT

REPORT ON PRIVATE SECURITISATIONS HIGHLIGHTS

Seller Ratings

- Whereas seller ratings are mostly much lower. Private securitisation allow the sellers to access funding more cheaply.

Table 17 – Seller Rating Distribution (relative)

	2025-06	2024-12	2024-06	2023-12	2023-06	2022-12	2022-06	2021-12	2021-06	Δ_P
AAA	4.2%	3.9%	3,7%	1.3%	1.4%	1.1%	1.3%	1.3%	2.7%	7%
AA	4.4%	3.6%	4,8%	1.9%	0.5%	0.6%	0.0%	0.0%	1.3%	22%
A	21.9%	21.5%	23,6%	11.4%	9.6%	7.5%	7.4%	6.5%	16.3%	2%
BBB	32.3%	29.7%	34,0%	35.6%	37.2%	41.8%	41.2%	40.6%	43.0%	9%
BB and lower	19.2%	24.4%	18,5%	17.9%	18.2%	17.2%	20.7%	20.4%	22.8%	-21%
NR or undisclosed	18.0%	16.9%	15,5%	32.0%	33.1%	31.8%	29.3%	31.1%	13.9%	6%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	

EDW AGGREGATE DATA (FROM ESMA ANNEX 12 AND ANNEX 14)

ANNEX 12 AND ANNEX 14

https://www.esma.europa.eu/esmas-activities/markets-and-infrastructure/securitisation

The disclosure technical standards include 14 reporting templates. These are available below using a format that aims to assist stakeholders in their analysis of the technical standards. ESMA wishes to emphasise that the templates below are only provided for convenience and that the official versions of the templates are contained in the respective annexes available on the European Commission's website (**RTS** and **ITS**).

The templates below include references to the European Central Bank (ECB) asset-backed securities loan-level data templates where available. These references have been produced on a best-effort basis, and do not form part of ESMA's draft technical standards. ESMA therefore makes no claim or commitment as regards the accuracy of the mapping between the draft templates and the ECB's templates.

- **Annex 2: Underlying exposures – residential real estate**
- **Annex 3: Underlying exposures – commercial real estate**
- **Annex 4: Underlying exposures – corporate**
- **Annex 5: Underlying exposures – automobile**
- **Annex 6: Underlying exposures – consumer**
- **Annex 7: Underlying exposures – credit cards**
- **Annex 8: Underlying exposures – leasing**
- **Annex 9: Underlying exposures – esoteric**
- **Annex 10: Underlying exposures – add-on non-performing exposures**
- **Annex 11: Underlying exposures – ABCP**
- **Annex 12: Investor report – Non-ABCP securitisation**
- **Annex 13: Investor report – ABCP securitisation**
- **Annex 14: Inside information or significant event information – Non-ABCP securitisation**
- **Annex 15: Inside information or significant event information – ABCP securitisation**

ANNEX 12 AND ANNEX 14

ANNEX 12 AND 14 ARE NON-LOAN LEVEL DATA

Annex 12 contains investor report data such as:

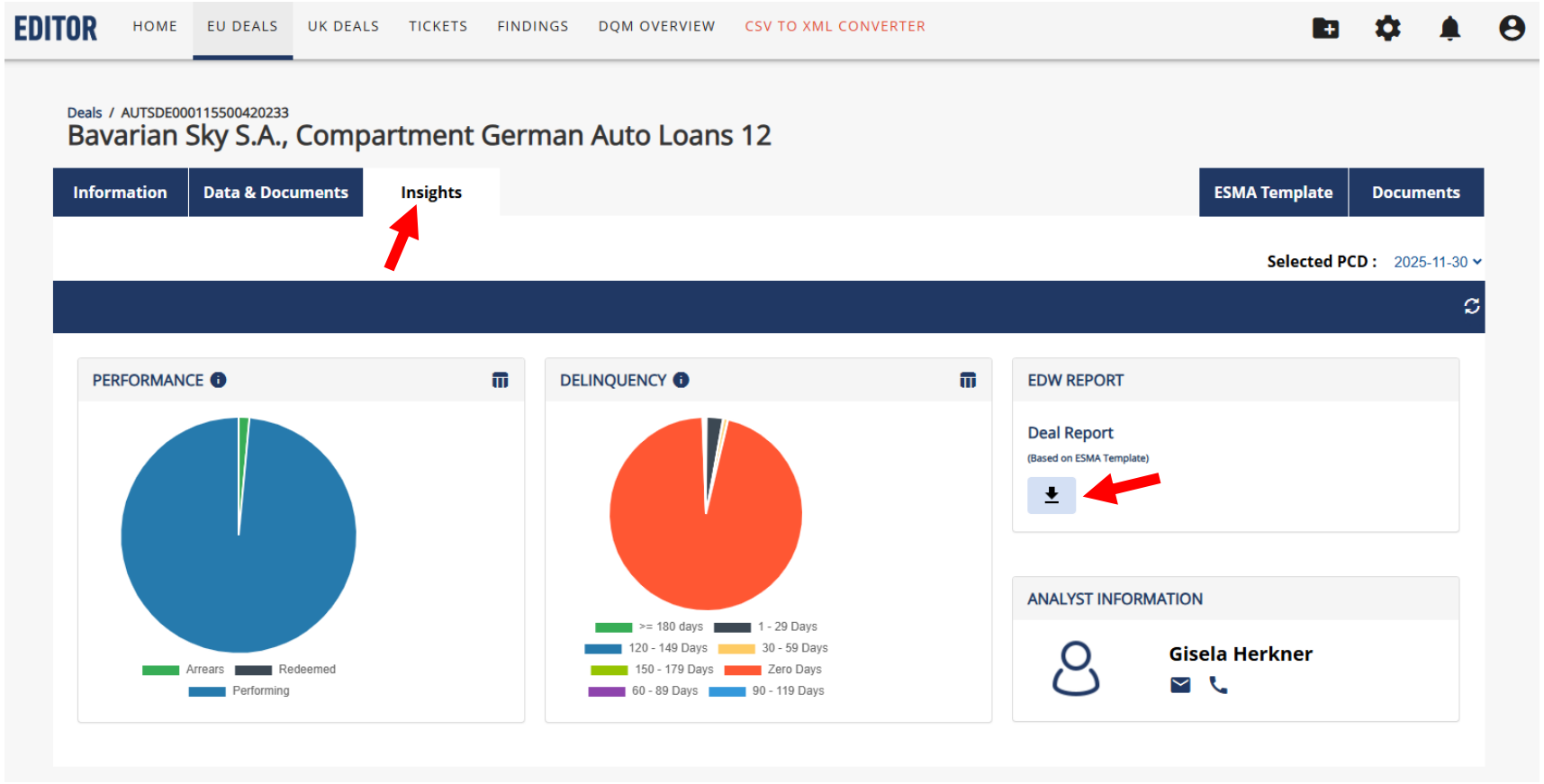
- Reporting entity contacts (IVSS5,6,7)
- Risk retention method (IVSS8) and holder (IVSS9)
- Trigger ratios (IVSS12) and trigger information (IVSR fields)
- Interest collections (IVSS17), principal collections (IVSS16) and recoveries
- Annualised CPR (IVSS22) and CDR (IVSS27)
- Aggregate risk metrics, performance information, delinquency rates (IVSS38 – IVSS44)
- Position by position cash flow info (IVSF type fields)

Annex14 contains "Inside information or significant event information"

- Securitisation info fields (SESS field series) such as No longer STS (SESS3) Current waterfall type (SESS8), swap details (SESS17 – SESS24)
- Tranche level information, Tranche Name (SEST5), ISIN (SEST4)
- Attachment Point and credit enhancement related (SEST31 – SEST35)
- Account level info (SESA fields) and Counterparty level information (SESP1)…

EDW DEAL REPORT – BASED ON ANNEX 12 (1)

EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12



EDW DEAL REPORT – BASED ON ANNEX 12 (2)

EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12

EUROPEAN DATAWAREHOUSE

DEAL REPORT

Bavarian Sky S.A., Compartment German Auto Loans 12

D2OIGPB6E66YOBJ9GT20N202301

2025-11-30	2025-12-22	2025-12-09
(Pool Cut-Off Date)	(IPD)	(Report Date)

EUROPEAN DATAWAREHOUSE GMBH

Walther-von-Cronberg-Platz 2
60594 Frankfurt am Main

enquiries@eurodw.eu
+49 (0) 69 50986 9017

EDW DEAL REPORT – BASED ON ANNEX 12 (3)

EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12

BOND REPORT

	A-1	B-1
ISIN	XS2583638924	XS2583641803
Type	Soft Bullet	Soft Bullet
Currency	EUR	EUR
Original Balance	900,000,000	75,100,000
Current Balance	133,861,613.51	75,100,000
Issue Date	2023-03-20	2023-03-20
Maturity Date	2030-03-20	2030-03-20
IPD	2025-12-22	2025-12-22
Paym.Freq	Monthly	Monthly
Current Coupon (%)	2.31	3
Margin / Spread (%)	0.70	0
Current Int. Rate Floating	1.61	3
Step Up/Dn Coupon	-	-
Step Up/Dn Date	-	-
Coupon Floor (%)	0	0
Coupon Cap (%)	-	-
Current Int. Rate Index	Euribor	Euribor
Next Call Date	-	-
Next Put Date	-	-
Pool Factor (%)	14.87%	100.00%
Curr.Attch Point (%)	43.10	8.67
Orgl.Attch Point (%)	8.70	1.00
Curr. Cred Enhcmnt (%)	43.10	8.67
Orig. Cred Enhcmnt (%)	8.70	1.00
Protection Type	-	-
Unpaid PDL	-	-

EDW DEAL REPORT – BASED ON ANNEX 12 (4)

EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12

SWAP INFORMATION

	Notional	Benchmark	Maturity
Interest Rate SWAP	154,695,849.62	EURI	2030-03-20

	Notional	Currency - Payer	Currency - Receiver	Exchange Rate	Maturity
Currency Rate SWAP	-	-	-	-	-

ACCOUNT INFORMATION

Account Type	Amortising?	Ccy	Target Balance	Actual Balance
Cash Reserve Account	No	EUR	9,751,000	9,751,000
Commingling Reserve Account	No	EUR	0	0

COUNTERPARTY INFORMATION

Counterparty Name	LEI Code	Type	Rating
Bavarian Sky S.A.	529900CITCOV0AQI3K03	Issuer	NR;NR (Fitch)
BMW Bank GmbH	D2OIGPB6E66YOBJ9GT20	Arranger Originator Seller Servicer	NR;NR (Fitch)
BNY MELLON CORPORATE TRUSTEE SERVICES LIMITED	2138009FOQYJ464QNK39	Trustee	NR;NR (Fitch)
CSC Global Solutions (Luxembourg) S.à r.l.	6354003I2W2IDTGB7D74	Administration Agent	NR;NR (Fitch)
DBRS Ratings GmbH	54930033N1HPUEY7I370	Other	NR;NR (Fitch)
FITCH RATINGS LTD	2138009F8YAHVC8W3Q52	Other	NR;NR (Fitch)

EDW DEAL REPORT – BASED ON ANNEX 12 (5)

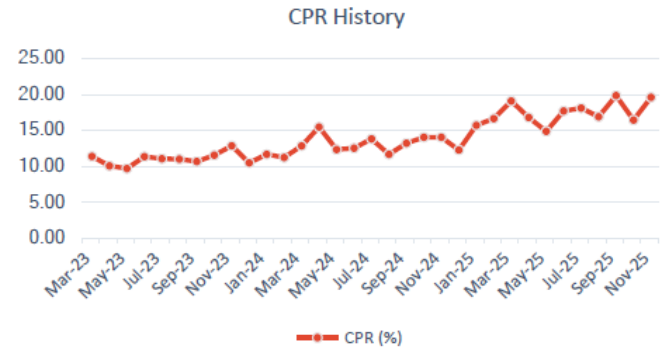
EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12

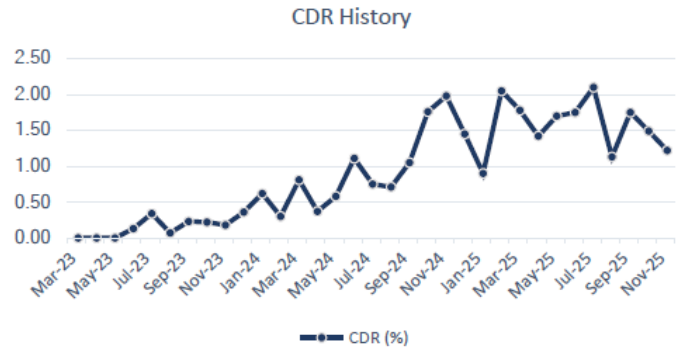
COLLECTIONS & RECOVERIES

Principal Collections	20,535,472.10
Interest Collections	773,795.46
Principal Recoveries	122,778.25
Interest Recoveries	4,626.40
Repurchased Exposures	476,539.41
Restructured Exposures	0
Defaulted Exposures	244,385.71
Defaulted Exposures CR	244,385.71
Annualised CPR (%)	19.61
Annualised CDR (%)	1.22

RISK

Dilutions	0
Gross Charge-offs In The Period	116,981.06
Internal LGD Estimate (%)	41.91
Excess Spread	0
Is Excess Spread Trapped?	No
Current Overcollateralisation (%)	1.04
Risk Retention Method	First Loss Tranche
Risk Retention Holder	Originator
Risk Transfer Method - True Sale?	Yes
Risk Weight Approach	Standardised Approach
Revolving/ Ramp-Up Period End-Date	-





EDW DEAL REPORT – BASED ON ANNEX 12 (6)

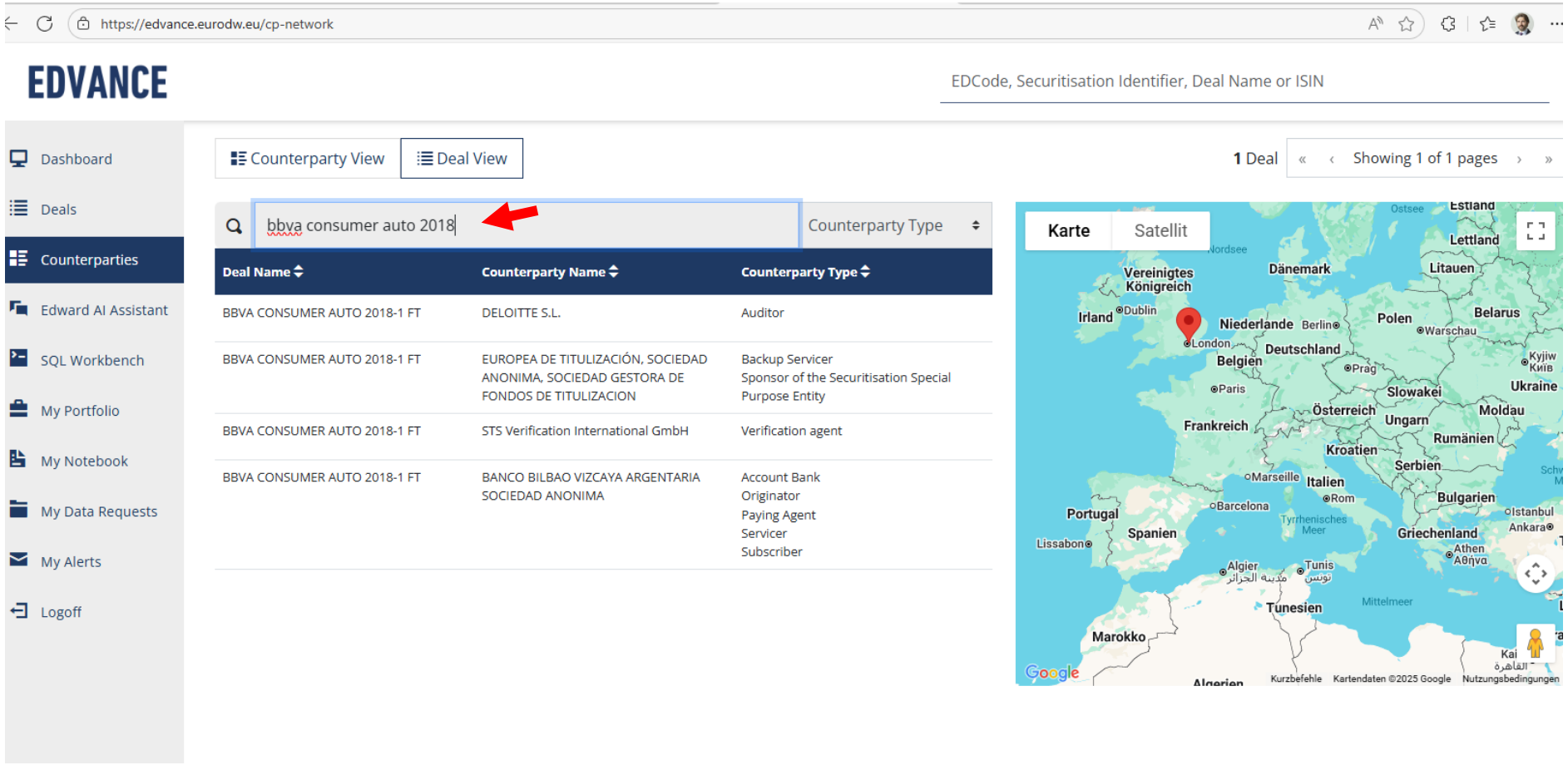
EDW "DEAL REPORTS" ARE ACCESSIBLE IN EDITOR AND USE DATA FROM ANNEX 12

WATERFALL INFORMATION

Serial Number	Cashflow Item	Amount Paid During Period	Available Funds Post
1	Amounts standing to the credit of the Cash Reserve	9,751,000.00	0.00
2	Total Principal Collections incl. Repurchases(CSEOM process+ user adjustments)	20,535,472.10	0.00
3	Interest Collections(CSEOM process+ user adjustments)	773,795.46	0.00
4	Late Recoveries(CSEOM process+ user adjustments)	-22,984.21	0.00
5	Amounts standing to the credit of the Replenishment Fund	0.00	0.00
6	Deemed Collection (user manual input)	13,889.13	0.00
7	Net Swap Receivable	0.00	0.00
8	Tax Payment made by the Seller and/or Servicer to the Issuer(user manual input)	0.00	0.00
9	Investment Income (Replenishment account) (user manual input)	0.00	0.00
10	Investment Income (Commingling, Indemnity, Cash Reserve, Set-Off Reserve accounts) (user manual inpu)	0.00	0.00
11	Indemnity Reserve Draw - Covering shortfall during Servicer Termination Event(user manual input)	0.00	0.00
12	Commingling Reserve Draw - Covering Shortfall during Servicer Termination Event (user manual input)	0.00	0.00
13	Set-Off Reserve Draw - Covering Shortfall during Servicer Termination Event (user manual input)	0.00	0.00
14	Available Distribution Amount	31,051,172.48	0.00
15	Available Distribution Amount	0.00	31,051,172.48
16	Taxes	0.00	31,051,172.48
17	Trustee Payment	0.00	31,051,172.48
18	Senior Expenses	-13,570.00	31,037,602.48
19	Swap Net Payment	-134,636.96	30,902,965.52
20	Class A Interest	-317,520.00	30,585,445.52
21	Cash Reserve	-9,751,000.00	20,834,445.52
22	Replenishment Amount	0.00	20,834,445.52
23	Class A Principal	-20,834,236.11	209.41
24	Class B Interest	0.00	209.41
25	Class B Principal	0.00	209.41
26	Swap Termination Event	0.00	209.41
27	Subordinated Loan Interest	0.00	209.41
28	Subordinated Loan Principal	0.00	209.41
29	Seller	-209.41	0.00

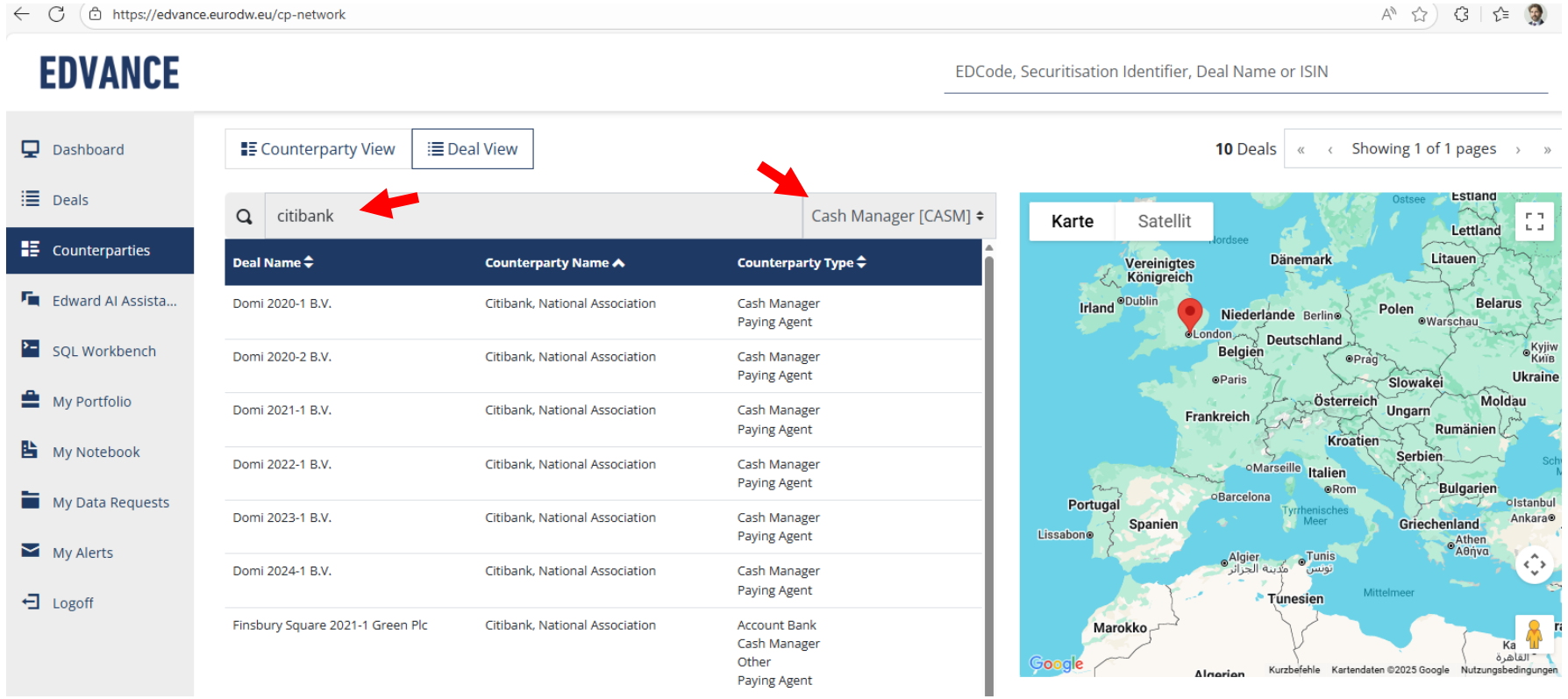
COUNTERPARTIES – FROM ANNEX 14 (1)

EDVANCE MAKES IT POSSIBLE TO SEE WHAT COUNTERPARTIES ARE LINKED TO A DEAL...



COUNTERPARTIES – FROM ANNEX 14 (2)

OR WHAT DEALS ARE LINKED TO A SPECIFIC COUNTERPARTY ACTING IN A SPECIFIC ROLE.



ATTACHMENT POINTS – FROM ANNEX 14 (1)

ATTACHMENT POINTS, ORIGINAL AND CURRENT ARE PART OF THE ANNEX 14 REPORTING, JUST AS

Attachment points

- Refer to article 256 of EU Regulation 575/2013 for definition of attachment points
- Attachment points have become a "talking point" lately, due to the "resilient securitisation" proposals…
- 579 deals have reported using Annex 14 in 2025, 571 with an identified A Class
- In 341 cases, the attachment point can be easily recalculated using available information, for 33 deals, there are decimal point type errors (values 100 times smaller than should be), for another 33 ND values are displayed…

Calculation:

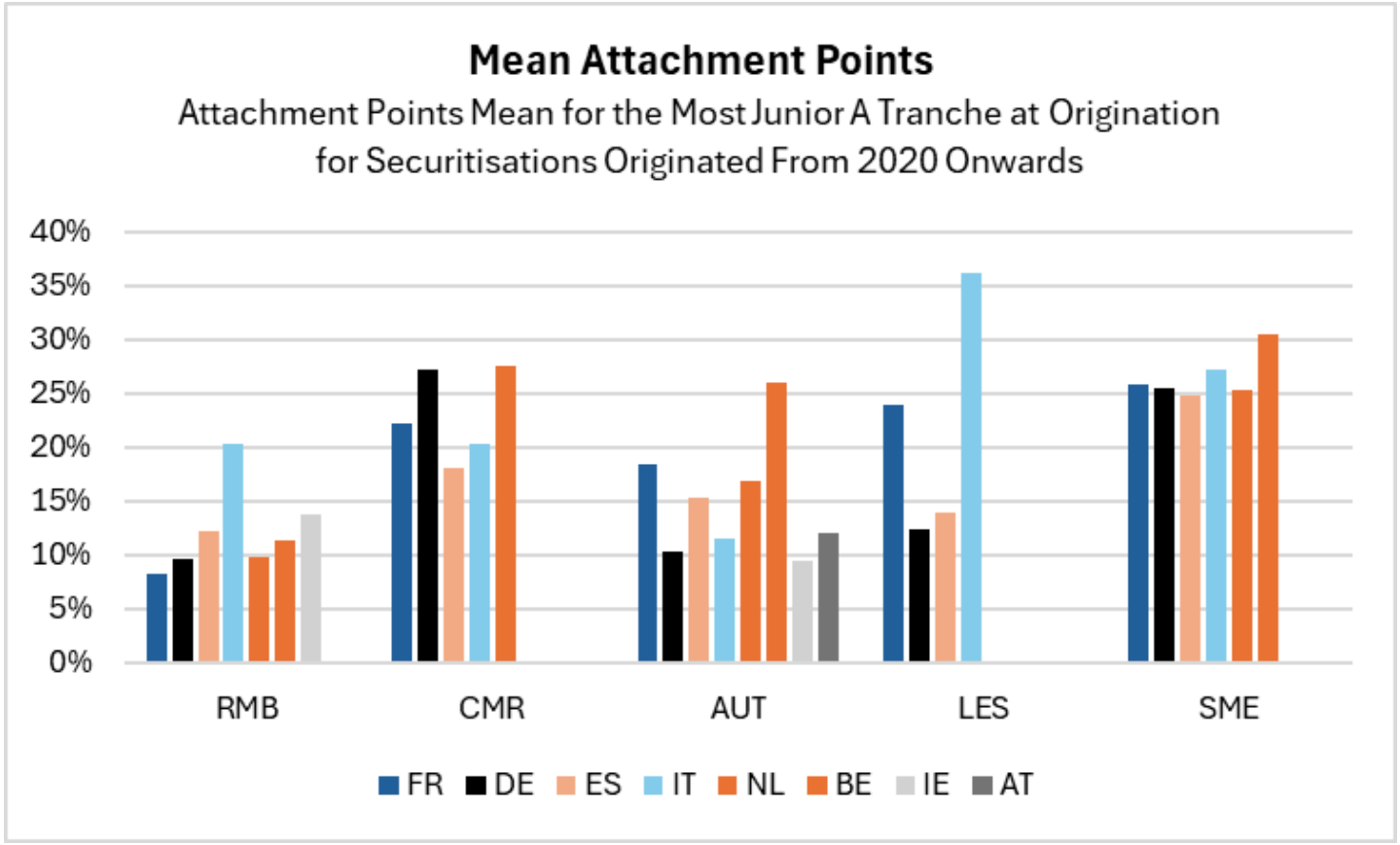
	Amount	% of Total	Attachment Point
Class A	500,000,000	74.07%	25.93%
Class B	32,500,000	4.81%	21.11%
Subordinated	142,500,000	21.11%	0.00%
	675,000,000	100.00%	

ATTACHMENT POINTS – FROM ANNEX 14 (2)

STATISTICS FOR ATTACHMENT POINTS

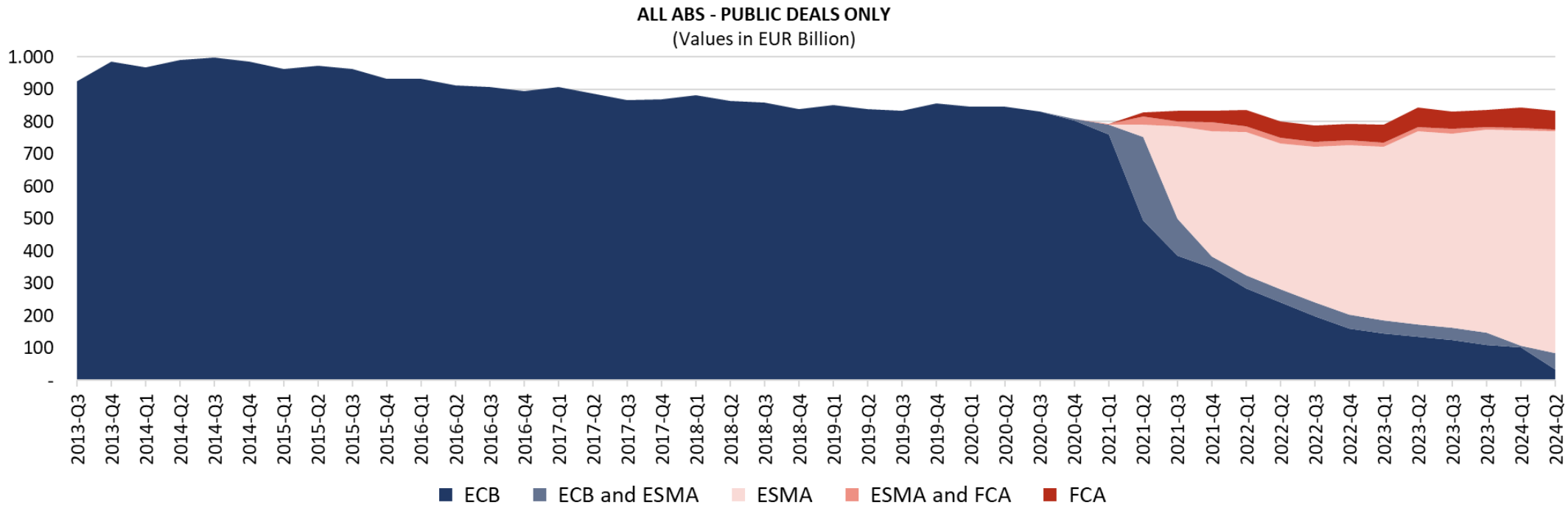
- **Attachment points**
  - Using verified data for recent securitisations, looking at attachment point below the most “Junior senior” tranche (i.e. the A2 if there is an A1 and an A2)
  - Some variations across deals and countries but generally…
    - Around 12% for mortgages
    - Around 13% for Auto
    - Around 21% for consumer
    - Around 24% for leases
    - Around 27% for SME

ATTACHMENT POINTS – FROM ANNEX 14 (3)



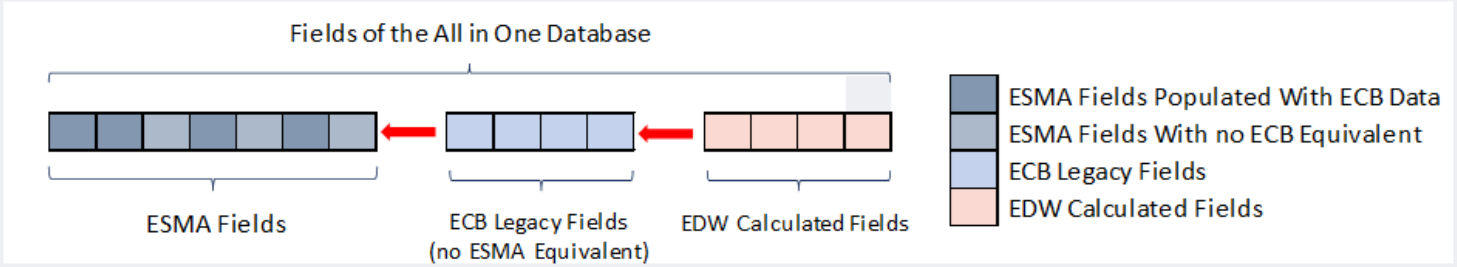
ALL IN ONE DATABASE: USING A DATA SAMPLE..

ECB VS ESMA VS FCA DATA AVAILABILITY

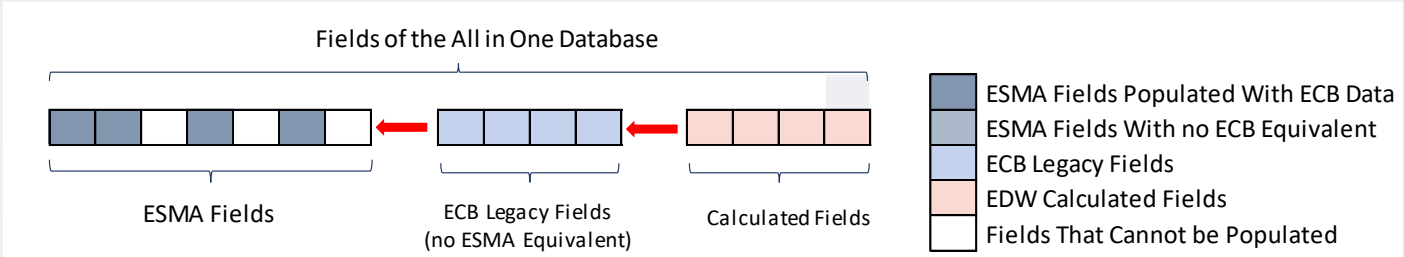


STRUCTURE

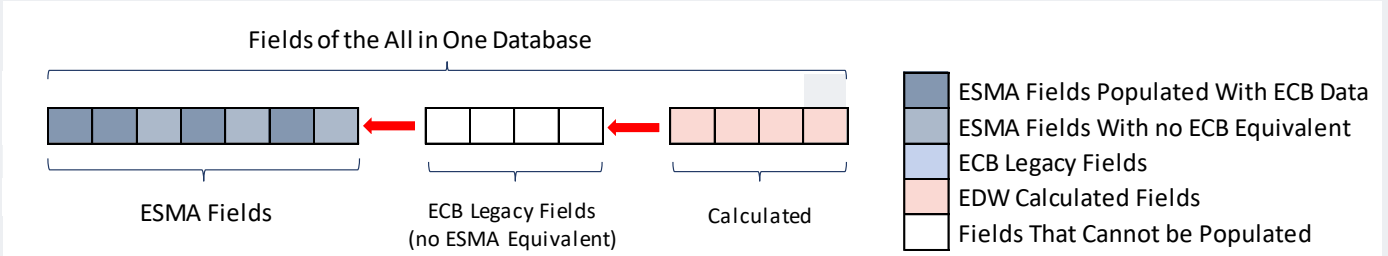
COMPOSITION OF THE ALL IN ONE DATABASE



WHEN ECB DATA IS IMPORTED IN THE ALL IN ONE DATABASE



WHEN ESMA DATA IS IMPORTED IN THE ALL IN ONE DATABASE



LIST OF CALCULATED FIELDS AS OF SEP. 2025 IN ECB ADJUSTED DATABASE

	AUTO	CONSUMER	CREDIT CARDS	LEASINGS	RMBS	SME
DATA_ORIGIN	yes	yes	yes	yes	yes	yes
EDCODE	yes	yes	yes	yes	yes	yes
Select_Unique	yes	yes	yes	yes	yes	yes
Sec_Id	yes	yes	yes	yes	yes	yes
PCD	yes	yes	yes	yes	yes	yes
GEO_1	yes	yes	yes	yes	yes	yes
GEO_2	yes	yes	yes	yes	yes	yes
GEO_3	yes	yes	yes	yes	yes	yes
QTR_ED	yes	yes	yes	yes	yes	yes
COUNTRY_ED	yes	yes	yes	yes	yes	yes
Manufacturer	yes	-	-	-	-	-
Model	yes	-	-	-	-	-
Fuel_Type	yes	-	-	-	-	-
Year_Model	yes	-	-	-	-	-
Engine_size	yes	-	-	-	-	-
Vehicle_type	yes	-	-	-	-	-
Euro_Conversion_Factor	yes	yes	yes	yes	yes	yes
ED_Loan_ID	To do	To do	To do	To do	To do	To do
ED_Borrower_ID	To do	To do	To do	To do	To do	To do
Days in arrears proxy	To do	To do		To do	To do	

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

LIST ALL UPLOADS AVAILABLE IN THE TABLE BY DEAL ID, DATE AND DATA ORIGIN, SHOW SUM OF ASSETS

```
SELECT
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
   ,sum(AUTL30) as Current_Bal

 FROM [res].[aio_aut_ES_FR_Trial]
 GROUP BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
ORDER BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
```

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

ONE OVERLAP PERIOD APPEARS FOR A DEAL, IT MAKES COMPARISONS POSSIBLE ESMA VS ECB

1	EDCODE	Sec_Id	data_origin	Select_Uniq	PCD	QTR	COUNT	Current_Bal
86	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-11-30	NULL	FR	1,162,792,037
87	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-12-31	2020-Q4	FR	1,167,942,391
88	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-01-31	NULL	FR	1,179,081,996
89	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-02-28	NULL	FR	1,191,744,473
90	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-03-31	2021-Q1	FR	1,205,562,978
91	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-04-30	NULL	FR	1,229,404,309
92	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-05-31	NULL	FR	1,234,749,666
93	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-06-30	2021-Q2	FR	1,232,794,693
94	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-07-31	NULL	FR	1,256,876,674
95	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-08-31	NULL	FR	1,274,880,831
96	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	0	2021-08-31	NULL	FR	1,274,880,831
97	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-09-30	2021-Q3	FR	1,283,251,939
98	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-10-31	NULL	FR	1,292,501,876
99	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-11-30	NULL	FR	1,312,807,809
100	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-12-31	2021-Q4	FR	1,329,092,078
101	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-01-31	NULL	FR	1,340,178,158
102	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-02-28	NULL	FR	1,342,774,770
103	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-03-31	2022-Q1	FR	1,341,005,762
104	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-04-30	NULL	FR	630,167,837
105	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-05-31	NULL	FR	643,365,297
106	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-06-30	2022-Q2	FR	650,775,582
107	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-07-31	NULL	FR	666,638,463
108	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-08-31	NULL	FR	681,672,668

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

QUARTER FLAGS MAKE IT EASY TO SELECT ONE ENTRY PER QUARTER

1	EDCODE	Sec_Id	data_origin	Select_Uniq	PCD	QTR	COUNT	Current_Bal
86	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-11-30	NULL	FR	1,162,792,037
87	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-12-31	2020-Q4	FR	1,167,942,391
88	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-01-31	NULL	FR	1,179,081,996
89	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-02-28	NULL	FR	1,191,744,473
90	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-03-31	2021-Q1	FR	1,205,562,978
91	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-04-30	NULL	FR	1,229,404,309
92	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-05-31	NULL	FR	1,234,749,666
93	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-06-30	2021-Q2	FR	1,232,794,693
94	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-07-31	NULL	FR	1,256,876,674
95	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-08-31	NULL	FR	1,274,880,831
96	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	0	2021-08-31	NULL	FR	1,274,880,831
97	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-09-30	2021-Q3	FR	1,283,251,939
98	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-10-31	NULL	FR	1,292,501,876
99	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-11-30	NULL	FR	1,312,807,809
100	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-12-31	2021-Q4	FR	1,329,092,078
101	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-01-31	NULL	FR	1,340,178,158
102	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-02-28	NULL	FR	1,342,774,770
103	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-03-31	2022-Q1	FR	1,341,005,762
104	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-04-30	NULL	FR	630,167,837
105	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-05-31	NULL	FR	643,365,297
106	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-06-30	2022-Q2	FR	650,775,582
107	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-07-31	NULL	FR	666,638,463
108	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-08-31	NULL	FR	681,672,668

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

FOCUSING ON THE OVERLAP...

1	EDCODE	Sec_Id	data_origin	Select_Uniqu	PCD	QTR	COUNT	Current_Bal
86	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-11-30	NULL	FR	1,162,792,037
87	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2020-12-31	2020-Q4	FR	1,167,942,391
88	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-01-31	NULL	FR	1,179,081,996
89	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-02-28	NULL	FR	1,191,744,473
90	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-03-31	2021-Q1	FR	1,205,562,978
91	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-04-30	NULL	FR	1,229,404,309
92	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-05-31	NULL	FR	1,234,749,666
93	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-06-30	2021-Q2	FR	1,232,794,693
94	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-07-31	NULL	FR	1,256,876,674
95	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2021-08-31	NULL	FR	1,274,880,831
96	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	0	2021-08-31	NULL	FR	1,274,880,831
97	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-09-30	2021-Q3	FR	1,283,251,939
98	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-10-31	NULL	FR	1,292,501,876
99	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-11-30	NULL	FR	1,312,807,809
100	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2021-12-31	2021-Q4	FR	1,329,092,078
101	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-01-31	NULL	FR	1,340,178,158
102	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-02-28	NULL	FR	1,342,774,770
103	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-03-31	2022-Q1	FR	1,341,005,762
104	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-04-30	NULL	FR	630,167,837
105	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-05-31	NULL	FR	643,365,297
106	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-06-30	2022-Q2	FR	650,775,582
107	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-07-31	NULL	FR	666,638,463
108	AUTMFR000101100320122	96950001WI712W7PQG45N201201	ESMA	1	2022-08-31	NULL	FR	681,672,668

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

WE CAN CHECK HOW THE REPORTING CHANGED WHEN SHIFTING FROM ECB TO ESMA

```
SELECT top 1000 *
  FROM [res].[aio_aut_ES_FR_Trial]
  WHERE EDCODE = 'AUTMFR000101100320122' AND PCD = '2021-08-31' AND  AUTL30 >0
  ORDER BY AUTL2,[data_origin] -- Exposure identifier
```

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

GROUPING LOAN BY LOAN THE ENTRIES FOR THIS DEAL IN THIS PERIOD, COMPARING ECB TO ESMA...

EDCODE	data_origin	AUTL2	AUTL12	AUTL14	AUTL16	AUTL24	AUTL25	AUTL26	AUTL27	AUTL28	AUTL29	AUTL30	AUTL32	AUTL36	AUTL37	AUTL39	AUTL53	AUTL54	AUTL55	AUTL56
AUTMFR000101100320122	ECB	15283717C	EMUK	INDV	24,000	2015-10	2021-10	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ESMA	15283717C	EMRS	INDV	24,000	2015-10-17	2021-10-15	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ECB	15285506C	PNNR	INDV	40,944	2015-09	2021-09	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ESMA	15285506C	PNNR	INDV	40,944	2015-09-19	2021-09-20	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ECB	15285749C	EMUK	INDV	17,760	2016-01	2022-02	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ESMA	15285749C	EMRS	INDV	17,760	2016-01-23	2022-02-10	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ECB	15285855C	EMUK	INDV	21,600	2015-09	2021-09	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ESMA	15285855C	EMRS	INDV	21,600	2015-09-08	2021-09-10	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ECB	15285973C	PNNR	INDV	33,240	2015-07	2023-08	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ESMA	15285973C	PNNR	INDV	33,240	2015-07-15	2023-08-10	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ECB	15288843C	EMUK	INDV	25,356	2015-07	2021-07	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ESMA	15288843C	EMRS	INDV	25,356	2015-07-27	2021-07-25	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ECB	15290425C	PNNR	INDV	20,532	2015-09	2021-09	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ESMA	15290425C	PNNR	INDV	20,532	2015-09-04	2021-09-05	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ECB	15295238C	EMUK	INDV	22,800	2015-10	2021-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ESMA	15295238C	EMRS	INDV	22,800	2015-10-09	2021-10-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ECB	15303810C	EMUK	INDV	34,560	2015-12	2021-12	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ESMA	15303810C	EMRS	INDV	34,560	2015-12-23	2021-12-25	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ECB	15309010C	PNNR	INDV	19,200	2015-09	2021-09	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ESMA	15309010C	PNNR	INDV	19,200	2015-09-25	2021-09-25	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ECB	15318858C	EMUK	INDV	35,340	2015-10	2021-10	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ESMA	15318858C	EMRS	INDV	35,340	2015-10-29	2021-10-30	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ECB	15321960C	EMUK	INDV	32,400	2015-10	2021-10	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ESMA	15321960C	EMRS	INDV	32,400	2015-10-20	2021-10-20	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ECB	15326319C	SFEM	INDV	10,074	2015-08	2021-09	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ESMA	15326319C	SFEM	INDV	10,074	2015-08-21	2021-09-05	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ECB	15327077C	EMUK	INDV	18,000	2016-01	2022-01	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX
AUTMFR000101100320122	ESMA	15327077C	EMRS	INDV	18,000	2016-01-13	2022-01-15	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

THE ECB DATA...

EDCODE	data_origin	AUTL2	AUTL12	AUTL14	AUTL16	AUTL24	AUTL25	AUTL26	AUTL27	AUTL28	AUTL29	AUTL30	AUTL32	AUTL36	AUTL37	AUTL39	AUTL53	AUTL54	AUTL55	AUTL56
AUTMFR000101100320122	ECB	15283717C	EMUK	INDV	24,000	2015-10	2021-10	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ESMA	15283717C	EMRS	INDV	24,000	2015-10-17	2021-10-15	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ECB	15285506C	PNNR	INDV	40,944	2015-09	2021-09	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ESMA	15285506C	PNNR	INDV	40,944	2015-09-19	2021-09-20	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ECB	15285749C	EMUK	INDV	17,760	2016-01	2022-02	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ESMA	15285749C	EMRS	INDV	17,760	2016-01-23	2022-02-10	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ECB	15285855C	EMUK	INDV	21,600	2015-09	2021-09	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ESMA	15285855C	EMRS	INDV	21,600	2015-09-08	2021-09-10	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ECB	15285973C	PNNR	INDV	33,240	2015-07	2023-08	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ESMA	15285973C	PNNR	INDV	33,240	2015-07-15	2023-08-10	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ECB	15288843C	EMUK	INDV	25,356	2015-07	2021-07	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ESMA	15288843C	EMRS	INDV	25,356	2015-07-27	2021-07-25	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ECB	15290425C	PNNR	INDV	20,532	2015-09	2021-09	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ESMA	15290425C	PNNR	INDV	20,532	2015-09-04	2021-09-05	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ECB	15295238C	EMUK	INDV	22,800	2015-10	2021-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ESMA	15295238C	EMRS	INDV	22,800	2015-10-09	2021-10-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ECB	15303810C	EMUK	INDV	34,560	2015-12	2021-12	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ESMA	15303810C	EMRS	INDV	34,560	2015-12-23	2021-12-25	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ECB	15309010C	PNNR	INDV	19,200	2015-09	2021-09	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ESMA	15309010C	PNNR	INDV	19,200	2015-09-25	2021-09-25	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ECB	15318858C	EMUK	INDV	35,340	2015-10	2021-10	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ESMA	15318858C	EMRS	INDV	35,340	2015-10-29	2021-10-30	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ECB	15321960C	EMUK	INDV	32,400	2015-10	2021-10	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ESMA	15321960C	EMRS	INDV	32,400	2015-10-20	2021-10-20	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ECB	15326319C	SFEM	INDV	10,074	2015-08	2021-09	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ESMA	15326319C	SFEM	INDV	10,074	2015-08-21	2021-09-05	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ECB	15327077C	EMUK	INDV	18,000	2016-01	2022-01	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX
AUTMFR000101100320122	ESMA	15327077C	EMRS	INDV	18,000	2016-01-13	2022-01-15	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

THE ESMA DATA...

EDCODE	data_origin	AUTL2	AUTL12	AUTL14	AUTL16	AUTL24	AUTL25	AUTL26	AUTL27	AUTL28	AUTL29	AUTL30	AUTL32	AUTL36	AUTL37	AUTL39	AUTL53	AUTL54	AUTL55	AUTL56
AUTMFR000101100320122	ECB	15283717C	EMUK	INDV	24,000	2015-10	2021-10	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ESMA	15283717C	EMRS	INDV	24,000	2015-10-17	2021-10-15	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ECB	15285506C	PNNR	INDV	40,944	2015-09	2021-09	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ESMA	15285506C	PNNR	INDV	40,944	2015-09-19	2021-09-20	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ECB	15285749C	EMUK	INDV	17,760	2016-01	2022-02	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ESMA	15285749C	EMRS	INDV	17,760	2016-01-23	2022-02-10	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ECB	15285855C	EMUK	INDV	21,600	2015-09	2021-09	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ESMA	15285855C	EMRS	INDV	21,600	2015-09-08	2021-09-10	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ECB	15285973C	PNNR	INDV	33,240	2015-07	2023-08	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ESMA	15285973C	PNNR	INDV	33,240	2015-07-15	2023-08-10	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ECB	15288843C	EMUK	INDV	25,356	2015-07	2021-07	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ESMA	15288843C	EMRS	INDV	25,356	2015-07-27	2021-07-25	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ECB	15290425C	PNNR	INDV	20,532	2015-09	2021-09	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ESMA	15290425C	PNNR	INDV	20,532	2015-09-04	2021-09-05	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ECB	15295238C	EMUK	INDV	22,800	2015-10	2021-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1:	2015	NEWX
AUTMFR000101100320122	ESMA	15295238C	EMRS	INDV	22,800	2015-10-09	2021-10-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1:	2015	NEWX
AUTMFR000101100320122	ECB	15303810C	EMUK	INDV	34,560	2015-12	2021-12	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ESMA	15303810C	EMRS	INDV	34,560	2015-12-23	2021-12-25	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ECB	15309010C	PNNR	INDV	19,200	2015-09	2021-09	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ESMA	15309010C	PNNR	INDV	19,200	2015-09-25	2021-09-25	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ECB	15318858C	EMUK	INDV	35,340	2015-10	2021-10	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9'	2015	NEWX
AUTMFR000101100320122	ESMA	15318858C	EMRS	INDV	35,340	2015-10-29	2021-10-30	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9'	2015	NEWX
AUTMFR000101100320122	ECB	15321960C	EMUK	INDV	32,400	2015-10	2021-10	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ESMA	15321960C	EMRS	INDV	32,400	2015-10-20	2021-10-20	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ECB	15326319C	SFEM	INDV	10,074	2015-08	2021-09	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ESMA	15326319C	SFEM	INDV	10,074	2015-08-21	2021-09-05	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ECB	15327077C	EMUK	INDV	18,000	2016-01	2022-01	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX
AUTMFR000101100320122	ESMA	15327077C	EMRS	INDV	18,000	2016-01-13	2022-01-15	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

EDCODE	data_origin	AUTL2	AUTL12	AUTL14	AUTL16	AUTL24	AUTL25	AUTL26	AUTL27	AUTL28	AUTL29	AUTL30	AUTL32	AUTL36	AUTL37	AUTL39	AUTL53	AUTL54	AUTL55	AUTL56
AUTMFR000101100320122	ECB	15283717C	EMUK	INDV	24,000	2015-10	2021-10	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ESMA	15283717C	EMRS	INDV	24,000	2015-10-17	2021-10-15	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ECB	15285506C	PNNR	INDV	40,944	2015-09	2021-09	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ESMA	15285506C	PNNR	INDV	40,944	2015-09-19	2021-09-20	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ECB	15285749C	EMUK	INDV	17,760	2016-01	2022-02	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ESMA	15285749C	EMRS	INDV	17,760	2016-01-23	2022-02-10	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ECB	15285855C	EMUK	INDV	21,600	2015-09	2021-09	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ESMA	15285855C	EMRS	INDV	21,600	2015-09-08	2021-09-10	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ECB	15285973C	PNNR	INDV	33,240	2015-07	2023-08	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ESMA	15285973C	PNNR	INDV	33,240	2015-07-15	2023-08-10	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ECB	15288843C	EMUK	INDV	25,356	2015-07	2021-07	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ESMA	15288843C	EMRS	INDV	25,356	2015-07-27	2021-07-25	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ECB	15290425C	PNNR	INDV	20,532	2015-09	2021-09	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ESMA	15290425C	PNNR	INDV	20,532	2015-09-04	2021-09-05	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ECB	15295238C	EMUK	INDV	22,800	2015-10	2021-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1:	2015	NEWX
AUTMFR000101100320122	ESMA	15295238C	EMRS	INDV	22,800	2015-10-09	2021-10-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1:	2015	NEWX
AUTMFR000101100320122	ECB	15303810C	EMUK	INDV	34,560	2015-12	2021-12	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ESMA	15303810C	EMRS	INDV	34,560	2015-12-23	2021-12-25	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ECB	15309010C	PNNR	INDV	19,200	2015-09	2021-09	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ESMA	15309010C	PNNR	INDV	19,200	2015-09-25	2021-09-25	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ECB	15318858C	EMUK	INDV	35,340	2015-10	2021-10	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ESMA	15318858C	EMRS	INDV	35,340	2015-10-29	2021-10-30	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ECB	15321960C	EMUK	INDV	32,400	2015-10	2021-10	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ESMA	15321960C	EMRS	INDV	32,400	2015-10-20	2021-10-20	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ECB	15326319C	SFEM	INDV	10,074	2015-08	2021-09	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ESMA	15326319C	SFEM	INDV	10,074	2015-08-21	2021-09-05	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ECB	15327077C	EMUK	INDV	18,000	2016-01	2022-01	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX
AUTMFR000101100320122	ESMA	15327077C	EMRS	INDV	18,000	2016-01-13	2022-01-15	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

EDCODE	data_origin	AUTL2	AUTL12	AUTL14	AUTL16	AUTL24	AUTL25	AUTL26	AUTL27	AUTL28	AUTL29	AUTL30	AUTL32	AUTL36	AUTL37	AUTL39	AUTL53	AUTL54	AUTL55	AUTL56
AUTMFR000101100320122	ECB	15283717C	EMUK	INDV	24,000	2015-10	2021-10	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ESMA	15283717C	EMRS	INDV	24,000	2015-10-17	2021-10-15	73	ADLR	EUR	11,200	367	FIXE	CDTX	184.73	-	DACIA	52LLAU 12	2015	NEWX
AUTMFR000101100320122	ECB	15285506C	PNNR	INDV	40,944	2015-09	2021-09	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ESMA	15285506C	PNNR	INDV	40,944	2015-09-19	2021-09-20	73	ADLR	EUR	27,892	458	FIXE	CDTX	460.03	-	RENAULT	FEHXMD A	2015	NEWX
AUTMFR000101100320122	ECB	15285749C	EMUK	INDV	17,760	2016-01	2022-02	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ESMA	15285749C	EMRS	INDV	17,760	2016-01-23	2022-02-10	74	ADLR	EUR	18,636	1,817	FIXE	CDTX	307.37	-	DACIA	79HE0PI X	2016	NEWX
AUTMFR000101100320122	ECB	15285855C	EMUK	INDV	21,600	2015-09	2021-09	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ESMA	15285855C	EMRS	INDV	21,600	2015-09-08	2021-09-10	73	ADLR	EUR	13,988	230	FIXE	CDTX	230.71	1,100	RENAULT	M3BPEPIT	2015	NEWX
AUTMFR000101100320122	ECB	15285973C	PNNR	INDV	33,240	2015-07	2023-08	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ESMA	15285973C	PNNR	INDV	33,240	2015-07-15	2023-08-10	98	ADLR	EUR	8,831	2,626	FIXE	CDTX	114.9	300	RENAULT	CL3B5CL1	2012	USED
AUTMFR000101100320122	ECB	15288843C	EMUK	INDV	25,356	2015-07	2021-07	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ESMA	15288843C	EMRS	INDV	25,356	2015-07-27	2021-07-25	73	ADLR	EUR	25,000	412	FIXE	CDTX	412.34	-	RENAULT	LC3INT 20I	2014	USED
AUTMFR000101100320122	ECB	15290425C	PNNR	INDV	20,532	2015-09	2021-09	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ESMA	15290425C	PNNR	INDV	20,532	2015-09-04	2021-09-05	73	ADLR	EUR	10,732	176	FIXE	CDTX	177	-	DACIA	52LAMB 09	2015	NEWX
AUTMFR000101100320122	ECB	15295238C	EMUK	INDV	22,800	2015-10	2021-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ESMA	15295238C	EMRS	INDV	22,800	2015-10-09	2021-10-10	73	ADLR	EUR	9,960	326	FIXE	CDTX	164.27	-	DACIA	52BAMB 1	2015	NEWX
AUTMFR000101100320122	ECB	15303810C	EMUK	INDV	34,560	2015-12	2021-12	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ESMA	15303810C	EMRS	INDV	34,560	2015-12-23	2021-12-25	73	ADLR	EUR	5,000	326	FIXE	CDTX	82.46	13,700	RENAULT	KP2K LT21	2015	NEWX
AUTMFR000101100320122	ECB	15309010C	PNNR	INDV	19,200	2015-09	2021-09	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ESMA	15309010C	PNNR	INDV	19,200	2015-09-25	2021-09-25	73	ADLR	EUR	8,600	141	FIXE	CDTX	141.85	5,500	RENAULT	CL4TRD 09	2015	NEWX
AUTMFR000101100320122	ECB	15318858C	EMUK	INDV	35,340	2015-10	2021-10	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ESMA	15318858C	EMRS	INDV	35,340	2015-10-29	2021-10-30	73	ADLR	EUR	9,000	295	FIXE	CDTX	148.44	3,700	RENAULT	TW3BR2 9	2015	NEWX
AUTMFR000101100320122	ECB	15321960C	EMUK	INDV	32,400	2015-10	2021-10	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ESMA	15321960C	EMRS	INDV	32,400	2015-10-20	2021-10-20	73	ADLR	EUR	14,962	385	FIXE	CDTX	193.76	-	DACIA	52BSAU 15	2015	NEWX
AUTMFR000101100320122	ECB	15326319C	SFEM	INDV	10,074	2015-08	2021-09	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ESMA	15326319C	SFEM	INDV	10,074	2015-08-21	2021-09-05	74	ADLR	EUR	12,158	200	FIXE	CDTX	200.94	-	RENAULT	CL4CEP 15	2014	USED
AUTMFR000101100320122	ECB	15327077C	EMUK	INDV	18,000	2016-01	2022-01	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX
AUTMFR000101100320122	ESMA	15327077C	EMRS	INDV	18,000	2016-01-13	2022-01-15	73	ADLR	EUR	14,555	1,185	FIXE	CDTX	240.06	-	DACIA	92JASL5 12	2016	NEWX

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

AUTL54	AUTL55	AUTL56	AUTL59	AUTL60	AUTL70	data_orig	EDCODE PCD		GEO_1	GEO_2	GEO_3	Manufacturer	Model	Car_Segment
52LLAU 12	2015	NEWX	100	11,200	PERF	ECB	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Seine-et-I	DACIA	NULL	NULL
52LLAU 12	2015	NEWX	100	11,200	PERF	ESMA	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Seine-et-I	DACIA	NULL	NULL
FEHXMD A	2015	NEWX	100	27,892	PERF	ECB	AUTMFR0	2021-08-31	Nouvelle-	Aquitaine	Landes	RENAULT	KADJAR	J (SUV)
FEHXMD A	2015	NEWX	100	27,892	PERF	ESMA	AUTMFR0	2021-08-31	Nouvelle-	Aquitaine	Landes	RENAULT	KADJAR	J (SUV)
79HE0PI X	2016	NEWX	100	18,636	PERF	ECB	AUTMFR0	2021-08-31	Centre - V	Centre	Loir-et-Cl	DACIA	NULL	NULL
79HE0PI X	2016	NEWX	100	18,636	PERF	ESMA	AUTMFR0	2021-08-31	Centre - V	Centre	Loir-et-Cl	DACIA	NULL	NULL
M3BPEPIT	2015	NEWX	93	15,088	PERF	ECB	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Val-de-M	RENAULT	MASTER E-TE(	Light Commercial Vehicle
M3BPEPIT	2015	NEWX	93	15,088	PERF	ESMA	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Val-de-M	RENAULT	MASTER E-TE(	Light Commercial Vehicle
CL3B5CL1	2012	USED	97	9,131	DTCR	ECB	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	RENAULT	NULL	NULL
CL3B5CL1	2012	USED	97	9,131	DADB	ESMA	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	RENAULT	NULL	NULL
LC3INT 20I	2014	USED	100	25,000	ARRE	ECB	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Essonne	RENAULT	LAGUNA	D (Large cars)
LC3INT 20I	2014	USED	100	25,000	ARRE	ESMA	AUTMFR0	2021-08-31	Ile-de-Fra	Ile-de-Fra	Essonne	RENAULT	LAGUNA	D (Large cars)
52LAMB 09	2015	NEWX	100	10,732	PERF	ECB	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	DACIA	NULL	NULL
52LAMB 09	2015	NEWX	100	10,732	PERF	ESMA	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	DACIA	NULL	NULL
52BAMB 1	2015	NEWX	100	9,960	PERF	ECB	AUTMFR0	2021-08-31	Auvergne	Rhone-Al	Ain	DACIA	SANDERO	B (Small cars)
52BAMB 1	2015	NEWX	100	9,960	PERF	ESMA	AUTMFR0	2021-08-31	Auvergne	Rhone-Al	Ain	DACIA	SANDERO	B (Small cars)
KP2K LT21	2015	NEWX	27	18,700	PERF	ECB	AUTMFR0	2021-08-31	Bourgogr	Bourgogr	Cote-d'Or	RENAULT	KANGOO	Light Commercial Vehicle
KP2K LT21	2015	NEWX	27	18,700	PERF	ESMA	AUTMFR0	2021-08-31	Bourgogr	Bourgogr	Cote-d'Or	RENAULT	KANGOO	Light Commercial Vehicle
CL4TRD 09	2015	NEWX	61	14,100	PERF	ECB	AUTMFR0	2021-08-31	Normanc	Basse-Nc	Calvados	RENAULT	CLIO	B (Small cars)
CL4TRD 09	2015	NEWX	61	14,100	PERF	ESMA	AUTMFR0	2021-08-31	Normanc	Basse-Nc	Calvados	RENAULT	CLIO	B (Small cars)
TW3BR2 9	2015	NEWX	71	12,700	PERF	ECB	AUTMFR0	2021-08-31	Grand Est	Champag	Marne	RENAULT	TWINGO	A (City Cars)
TW3BR2 9	2015	NEWX	71	12,700	PERF	ESMA	AUTMFR0	2021-08-31	Grand Est	Champag	Marne	RENAULT	TWINGO	A (City Cars)
52BSAU 15	2015	NEWX	100	14,962	PERF	ECB	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	DACIA	SANDERO	B (Small cars)
52BSAU 15	2015	NEWX	100	14,962	PERF	ESMA	AUTMFR0	2021-08-31	Hauts-de	Nord-Pas	Nord	DACIA	SANDERO	B (Small cars)
CL4CEP 15	2014	USED	100	12,158	PERF	ECB	AUTMFR0	2021-08-31	Occitanie	Languedc	Herault	RENAULT	CLIO	B (Small cars)
CL4CEP 15	2014	USED	100	12,158	PERF	ESMA	AUTMFR0	2021-08-31	Occitanie	Languedc	Herault	RENAULT	CLIO	B (Small cars)
92JASL5 12	2016	NEWX	100	14,555	PERF	ECB	AUTMFR0	2021-08-31	Occitanie	Languedc	Herault	DACIA	LODGY	M (MPV)
92JASL5 12	2016	NEWX	100	14,555	PERF	ESMA	AUTMFR0	2021-08-31	Occitanie	Languedc	Herault	DACIA	LODGY	M (MPV)

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

MODIFYING THE INITIAL QUERY TO HAVE ONLY ONE SUBMISSION PER DEAL AND PER QUARTER

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   ,[COUNTRY]
   ,sum(AUTL30) as Current_Bal

 FROM [res].[aio_aut_ES_FR_Trial]
 GROUP BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
ORDER BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
```

```
SELECT
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
   ,sum(AUTL30) as Current_Bal

 FROM [res].[aio_aut_ES_FR_Trial]
 WHERE QTR IS NOT NULL AND Select_Unique = 1
 GROUP BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
ORDER BY
    [EDCODE]
   ,[Sec_Id]
   ,[data_origin]
   ,[Select_Unique]
   ,[PCD]
   ,[QTR]
   ,[COUNTRY]
```

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

EDCODE	Sec_Id	data_orig	Select_Uniq	PCD	QTR	COUNTI	Current_Bal
AUTMFR0001011003	96950001WI712W7P	ECB	1	2018-06-30	2018-Q2	FR	612,125,017
AUTMFR0001011003	96950001WI712W7P	ECB	1	2018-09-30	2018-Q3	FR	659,545,060
AUTMFR0001011003	96950001WI712W7P	ECB	1	2018-12-31	2018-Q4	FR	671,629,855
AUTMFR0001011003	96950001WI712W7P	ECB	1	2019-03-31	2019-Q1	FR	591,044,551
AUTMFR0001011003	96950001WI712W7P	ECB	1	2019-06-30	2019-Q2	FR	501,426,117
AUTMFR0001011003	96950001WI712W7P	ECB	1	2019-09-30	2019-Q3	FR	482,611,792
AUTMFR0001011003	96950001WI712W7P	ECB	1	2019-12-31	2019-Q4	FR	537,132,405
AUTMFR0001011003	96950001WI712W7P	ECB	1	2020-03-31	2020-Q1	FR	858,543,064
AUTMFR0001011003	96950001WI712W7P	ECB	1	2020-06-30	2020-Q2	FR	865,250,487
AUTMFR0001011003	96950001WI712W7P	ECB	1	2020-09-30	2020-Q3	FR	1,069,575,248
AUTMFR0001011003	96950001WI712W7P	ECB	1	2020-12-31	2020-Q4	FR	1,167,942,391
AUTMFR0001011003	96950001WI712W7P	ECB	1	2021-03-31	2021-Q1	FR	1,205,562,978
AUTMFR0001011003	96950001WI712W7P	ECB	1	2021-06-30	2021-Q2	FR	1,232,794,693
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2021-09-30	2021-Q3	FR	1,283,251,939
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2021-12-31	2021-Q4	FR	1,329,092,078
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2022-03-31	2022-Q1	FR	1,341,005,762
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2022-06-30	2022-Q2	FR	650,775,582
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2022-09-30	2022-Q3	FR	692,065,248
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2022-12-31	2022-Q4	FR	781,716,051
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2023-03-31	2023-Q1	FR	764,262,596
AUTMFR0001011003	96950001WI712W7P	ESMA	1	2023-06-30	2023-Q2	FR	760,992,520

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

MODIFICATION OF THE PREVIOUS QUERY TO SELECT SPECIFICALLY THE AMOUNT IN ARREARS

```
SELECT
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
    ,sum(AUTL30) as Current_Bal

  FROM [res].[aio_aut_ES_FR_Trial]
  GROUP BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
ORDER BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
```

```
SELECT
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
    ,sum(AUTL30) as Current_Bal

  FROM [res].[aio_aut_ES_FR_Trial]
  WHERE QTR IS NOT NULL AND Select_Unique = 1
  GROUP BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
ORDER BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
```

```
SELECT
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
    ,sum(AUTL30) as Current_Bal

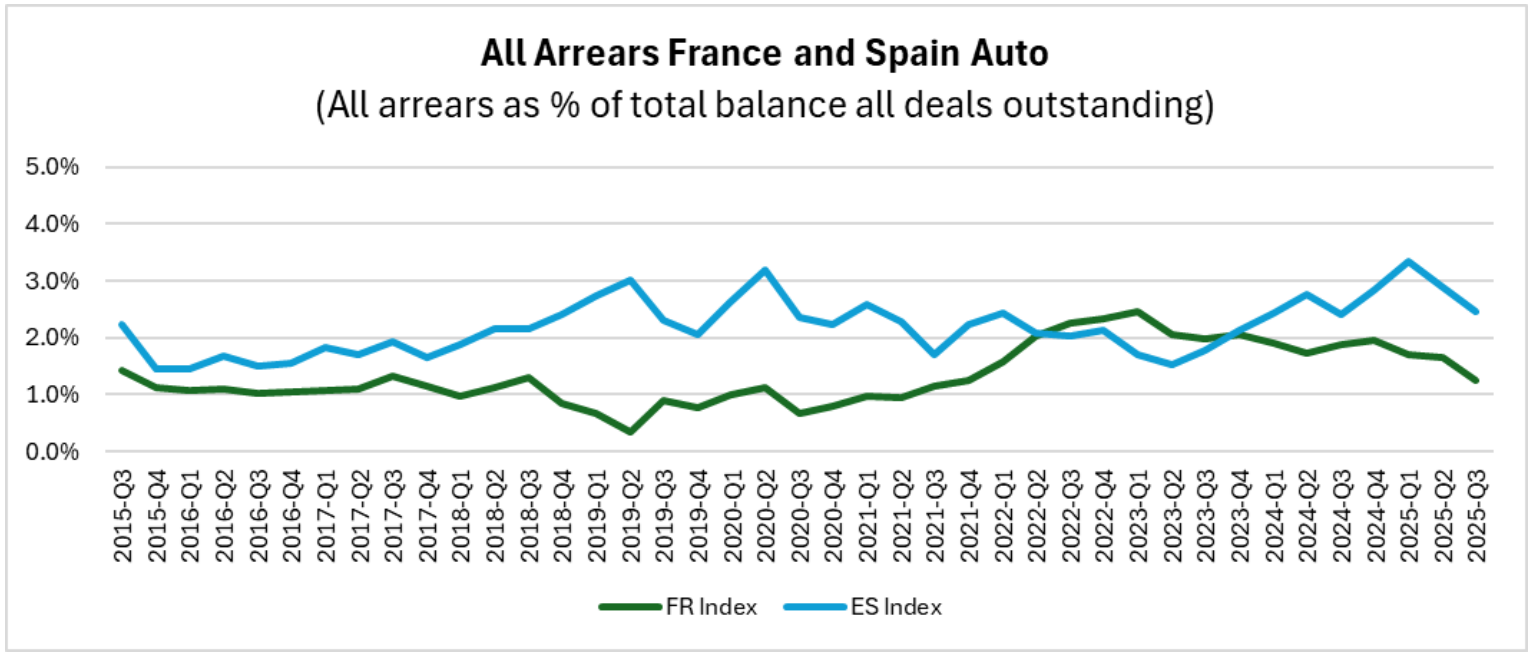
  FROM [res].[aio_aut_ES_FR_Trial]
  WHERE QTR IS NOT NULL AND Select_Unique = 1
  and (autl69 > 0 or aa66 > 0)
  GROUP BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
ORDER BY
    [EDCODE]
    ,[Sec_Id]
    ,[data_origin]
    ,[Select_Unique]
    ,[PCD]
    ,[QTR]
    ,[COUNTRY]
```

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS

MERGING THE OUTPUT OF BOTH QUERIES TO SHOW THE ARREARS PER DEAL PER PERIOD

EDCODE	Sec_Id	data_origin	Select_Uni	PCD	QTR	COUNTRY	Current_Bal_total	cbal arrears	arrears %
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2013-12-31	2013-Q4	FR	664,991,137	9,876,490	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2014-03-31	2014-Q1	FR	826,776,205	12,539,211	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2014-06-30	2014-Q2	FR	989,881,080	14,784,939	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2014-09-30	2014-Q3	FR	410,277,227	9,519,487	2.3%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2014-12-31	2014-Q4	FR	457,582,625	7,029,663	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2015-03-31	2015-Q1	FR	543,721,552	8,165,856	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2015-06-30	2015-Q2	FR	785,975,883	10,859,414	1.4%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2015-09-30	2015-Q3	FR	832,427,723	12,672,790	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2015-12-31	2015-Q4	FR	948,090,721	14,570,376	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2016-03-31	2016-Q1	FR	1,123,419,252	15,519,659	1.4%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2016-06-30	2016-Q2	FR	1,297,442,084	19,607,927	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2016-09-30	2016-Q3	FR	1,342,648,217	20,831,082	1.6%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2016-12-31	2016-Q4	FR	1,345,508,697	20,241,403	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2017-03-31	2017-Q1	FR	1,351,384,794	21,123,252	1.6%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2017-06-30	2017-Q2	FR	1,345,639,268	21,803,281	1.6%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2017-09-30	2017-Q3	FR	1,351,051,085	27,227,638	2.0%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2017-12-31	2017-Q4	FR	1,323,377,616	25,696,554	1.9%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2018-03-31	2018-Q1	FR	541,257,585	11,891,965	2.2%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2018-06-30	2018-Q2	FR	612,125,017	13,407,070	2.2%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2018-09-30	2018-Q3	FR	659,545,060	15,650,397	2.4%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2018-12-31	2018-Q4	FR	671,629,855	10,064,510	1.5%
AUTMFR000101100320122	96950001WI712W7PQG45N201201	ECB	1	2019-03-31	2019-Q1	FR	591,044,551	5,537,512	0.9%

DATA SAMPLE FROM AIO: SPANISH AND FRENCH AUTO LOANS



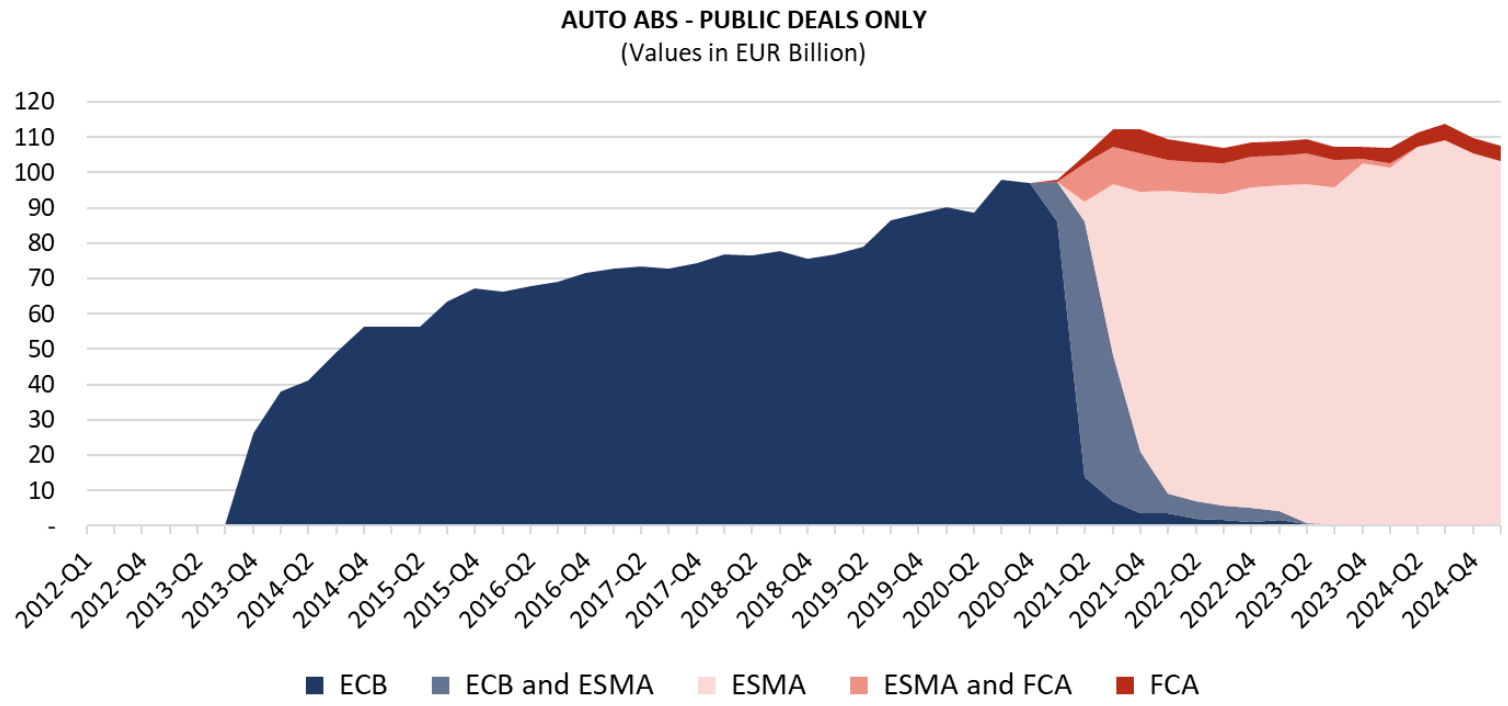
GAS UPDATE

LINKING AUTO ABS COLLATERAL TO CO2 EMISSIONS – INSIGHTS FROM GAS DATABASE

USMAN JAMIL, EUROPEAN DATAWAREHOUSE

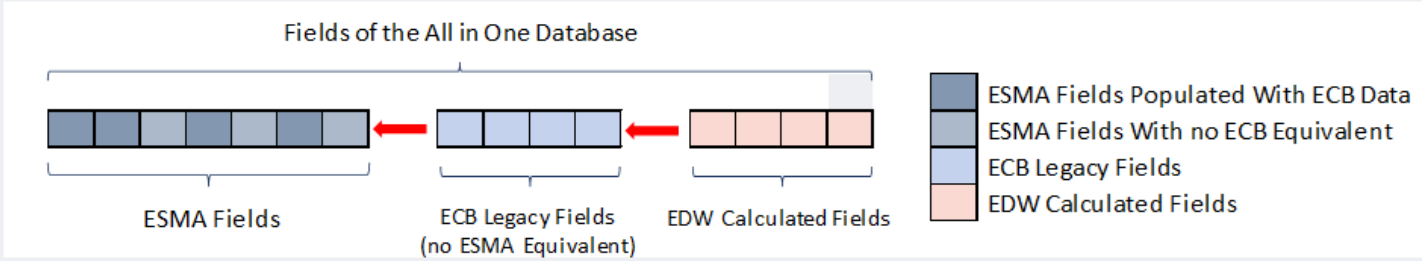
ALL IN ONE DATABASE: MERGING ECB AND ESMA DATA

MANAGING THE DISRUPTION: HISTORICAL DATA IS IN ECB FORMAT, RECENT DATA IS IN ESMA FORMAT

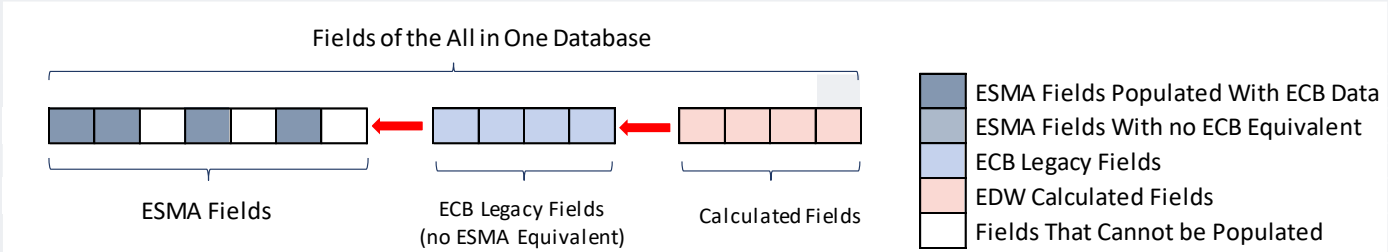


MERGING ECB AND ESMA DATA (ALL-IN-ONE DATABASE)

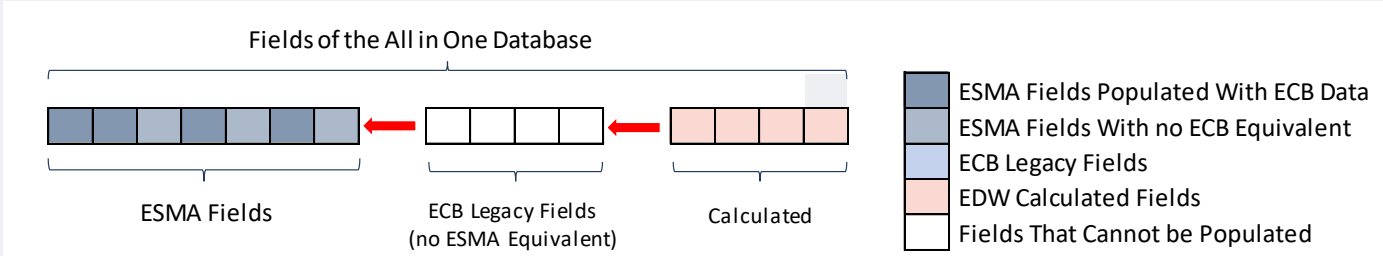
COMPOSITION OF THE ALL IN ONE DATABASE



WHEN ECB DATA IS IMPORTED IN THE ALL IN ONE DATABASE

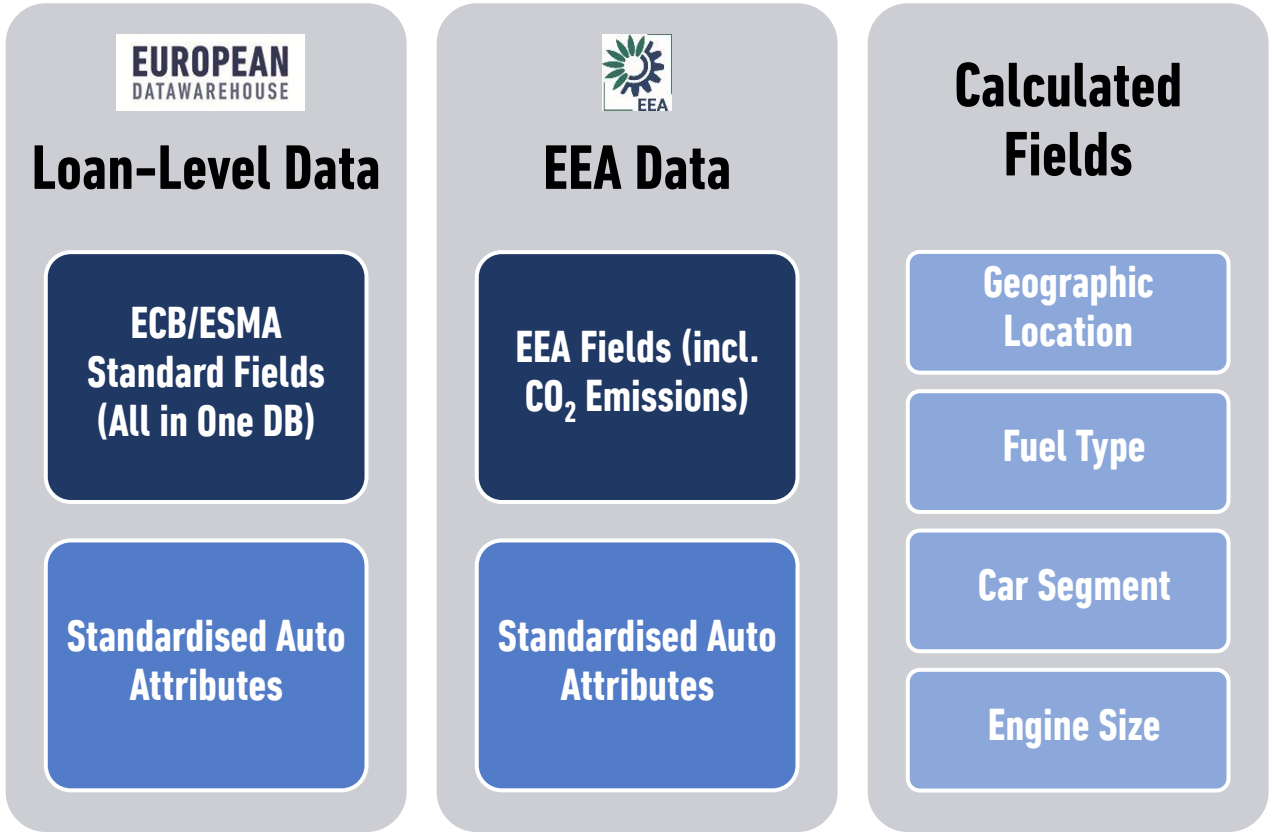


WHEN ESMA DATA IS IMPORTED IN THE ALL IN ONE DATABASE



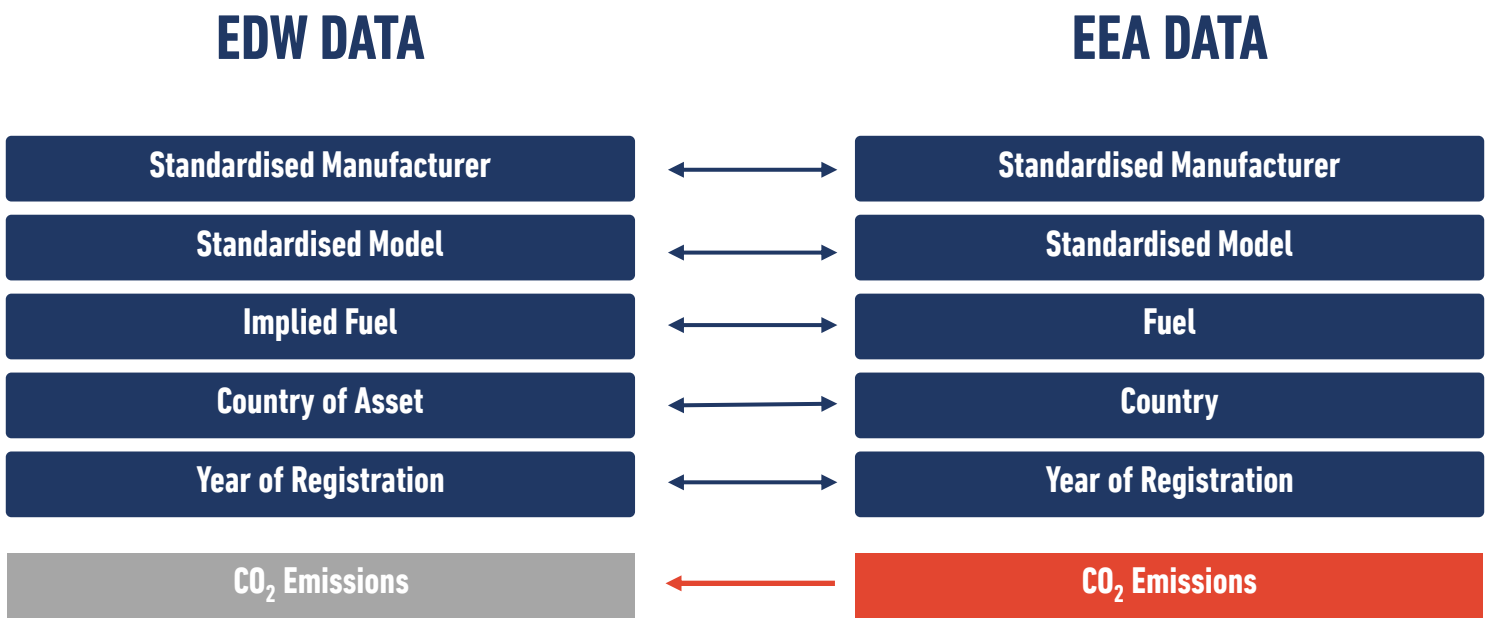
GAS DATABASE: LOAN-LEVEL DATA AND EEA DATA WITH EXPANDED FIELDS

A MORE COMPREHENSIVE DATABASE INCLUDING KEY FIELDS NEEDED FOR RELIABLE STATISTICAL ANALYSIS



MATCHING CO_2 EMISSIONS FOR CAR LOANS/LEASES WITH EDW DATA

95% OF LOANS/LEASES SUCCESSFULLY MATCHED WITH CO_2 EMISSIONS – INCLUDING ECB DATA



KEY FIGURES

> 450
DEALS

> 48 mm
LOANS

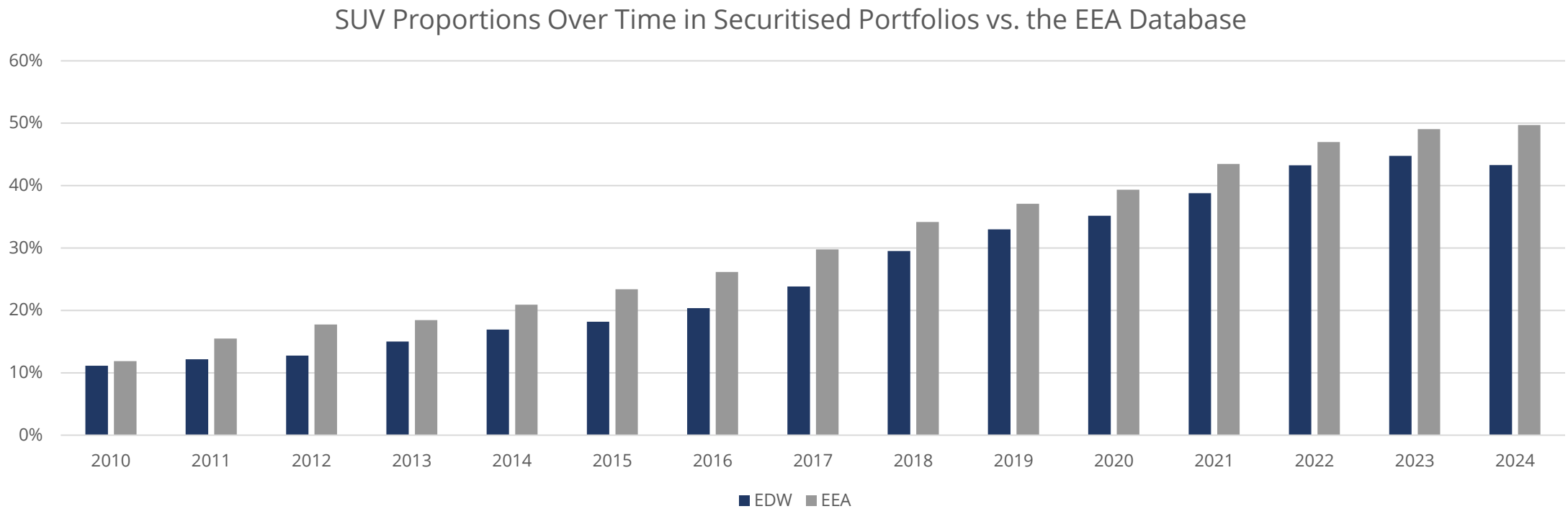
> 1.2 bn
ROWS

> 180
MANUFACTURERS

> 1,600
MODELS

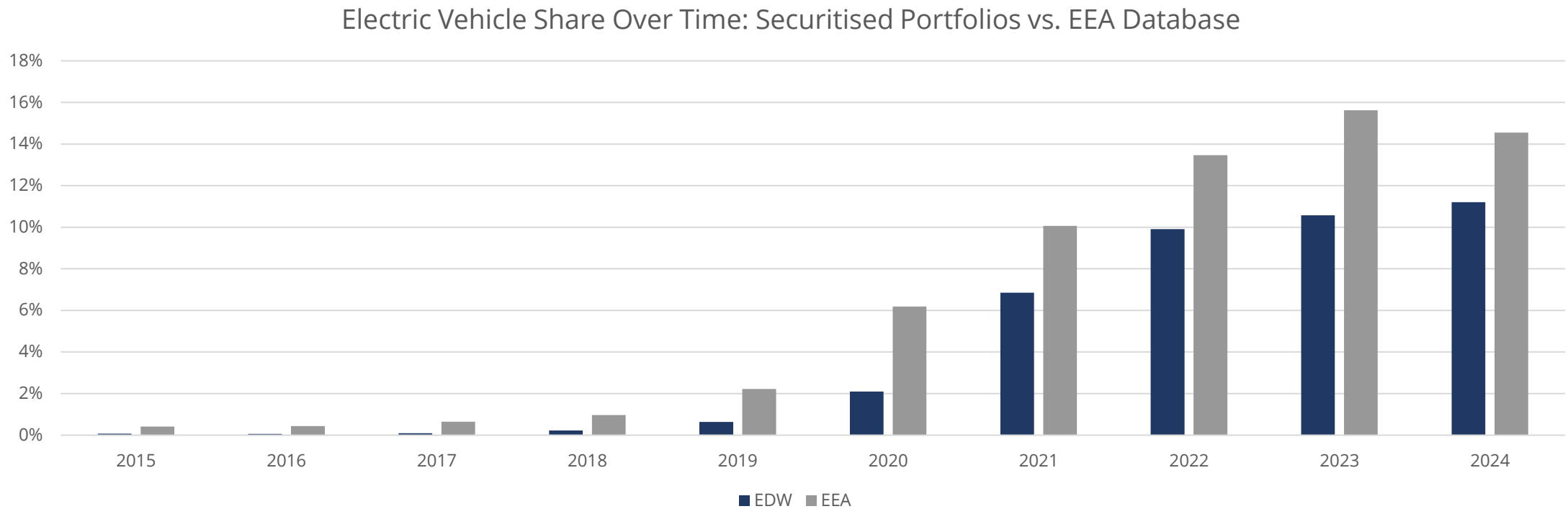
SECURITISED PORTFOLIOS VS. EEA DATABASE: A REPRESENTATIVE SAMPLE

SUVS NOW REPRESENT A SHARPLY RISING SHARE OF ALL VEHICLES SOLD IN THE LAST FIVE YEARS



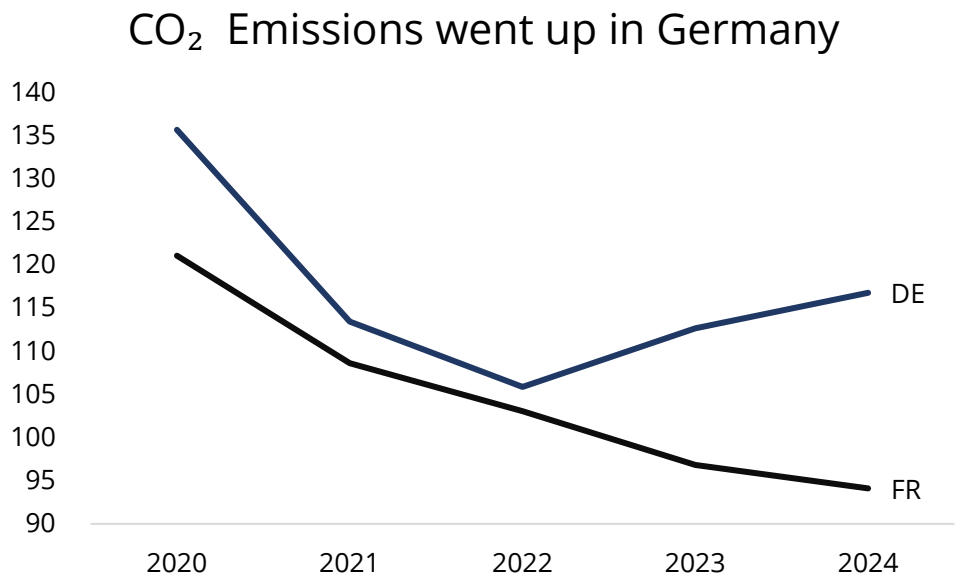
SECURITISED PORTFOLIOS VS. EEA DATABASE: A REPRESENTATIVE SAMPLE

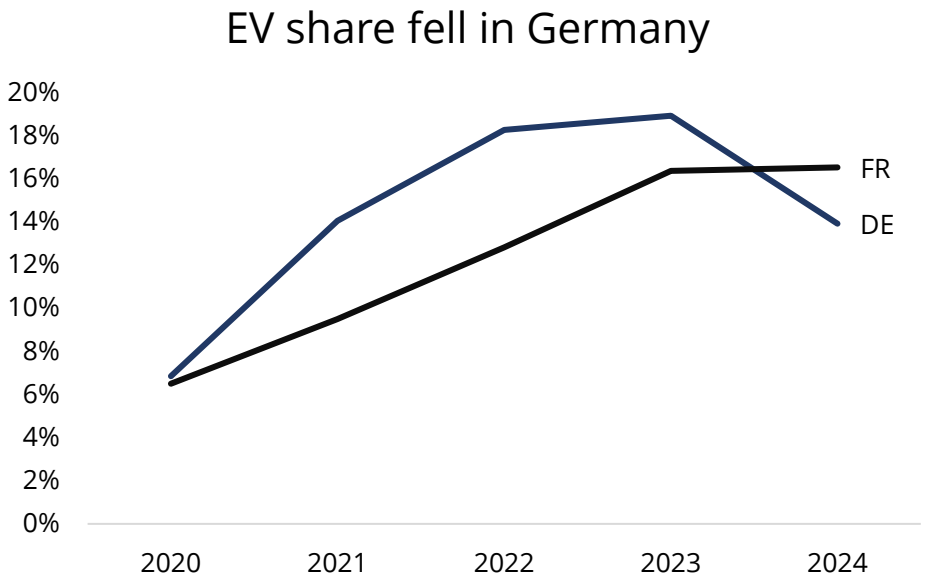
ELECTRIC VEHICLES NOW ACCOUNT FOR MORE THAN 10% OF ALL VEHICLES SOLD



GERMANY VS. FRANCE – DIVERGING PATHS ON CO_2 EMISSIONS AND E.V. ADOPTION

THE GERMAN SLOWDOWN CONTRASTS WITH CONTINUED FRENCH PROGRESS





WHAT ARE THE MOST POPULAR ELECTRIC VEHICLES IN GERMANY AND FRANCE?

GERMANY – TESLA MODEL Y

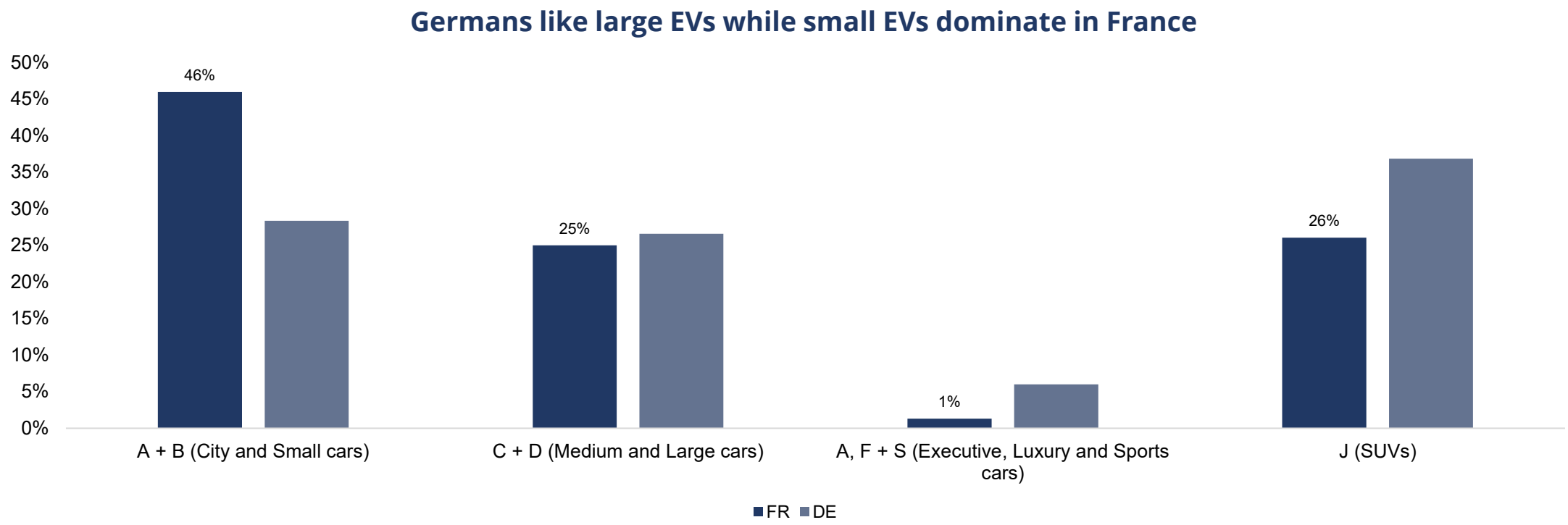
FRANCE – RENAULT ZOE

49,034	CAR VALUE	23,432
511	MONTHLY INSTALLMENT	185
116,012	BORROWER INCOME	41,347
5.3%	MONTHLY DTI	5.5%

TESLA FOR THE FEW!

ZOE FOR THE MANY!

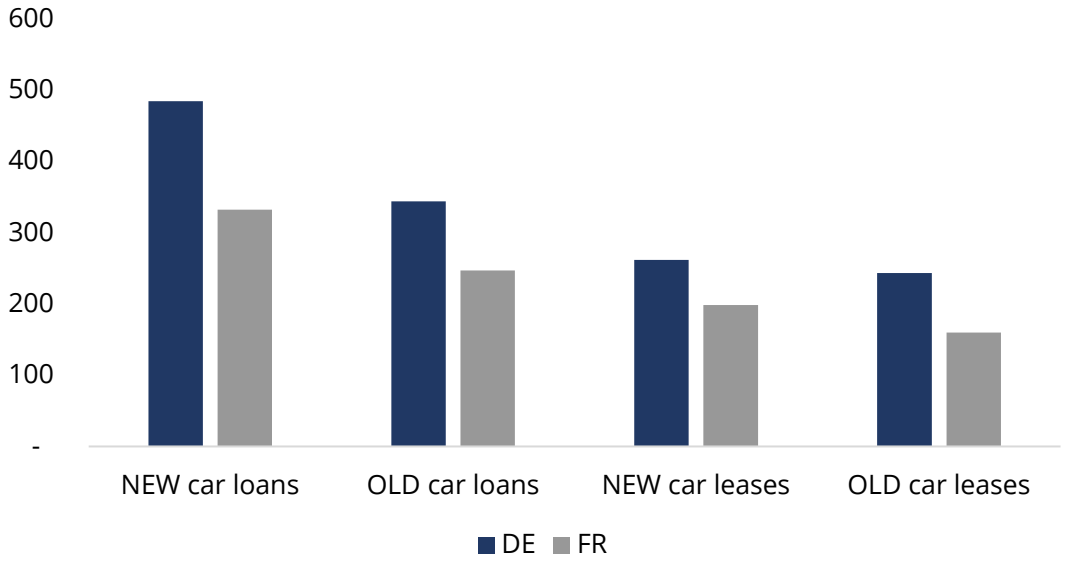
WHAT ARE THE MOST POPULAR E.V. SEGMENTS IN GERMANY AND FRANCE?



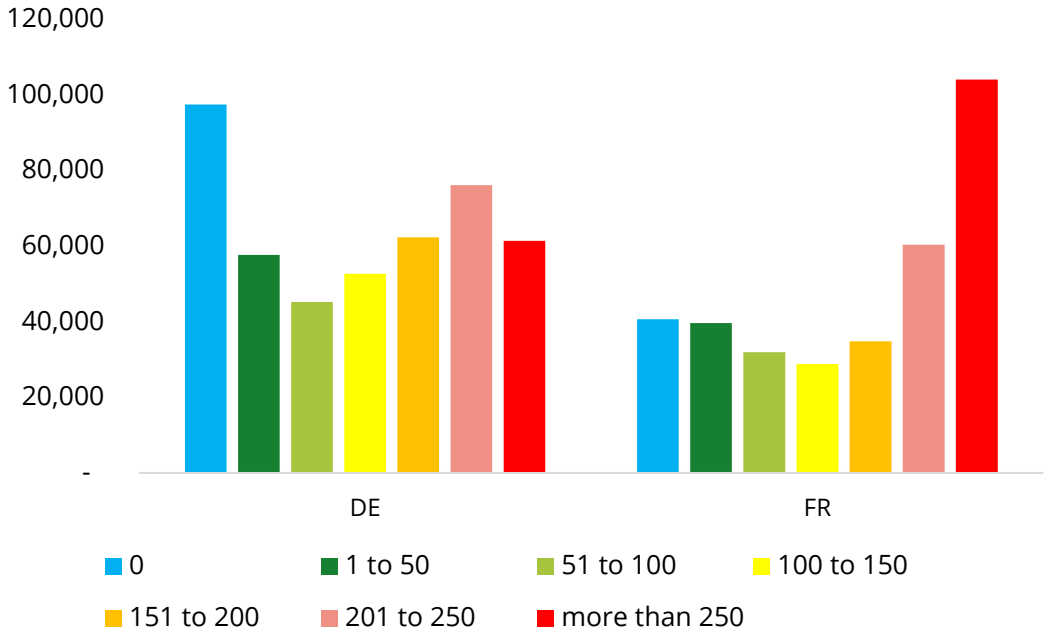
EV FINANCING PATTERNS: GERMANY VS. FRANCE

HIGH EARNERS REPRESENT GERMAN E.V. BUYERS WHILE FRENCH CONSUMERS OPT FOR AFFORDABLE MODELS

Monthly Installments for EVs are lower in France



Gross Income of Borrowers by CO_2 Emissions



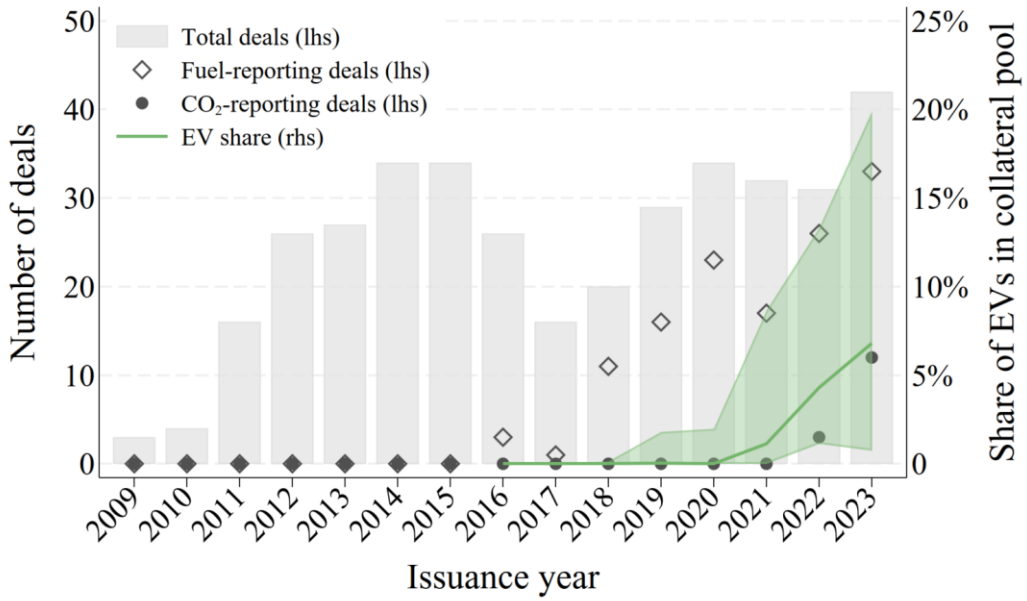
Note: Only using data for employed borrowers with loans originated since 2020
Average CO_2 emissions of cars in g/km (WLTP standard)

PUBLICATIONS FROM SAFE

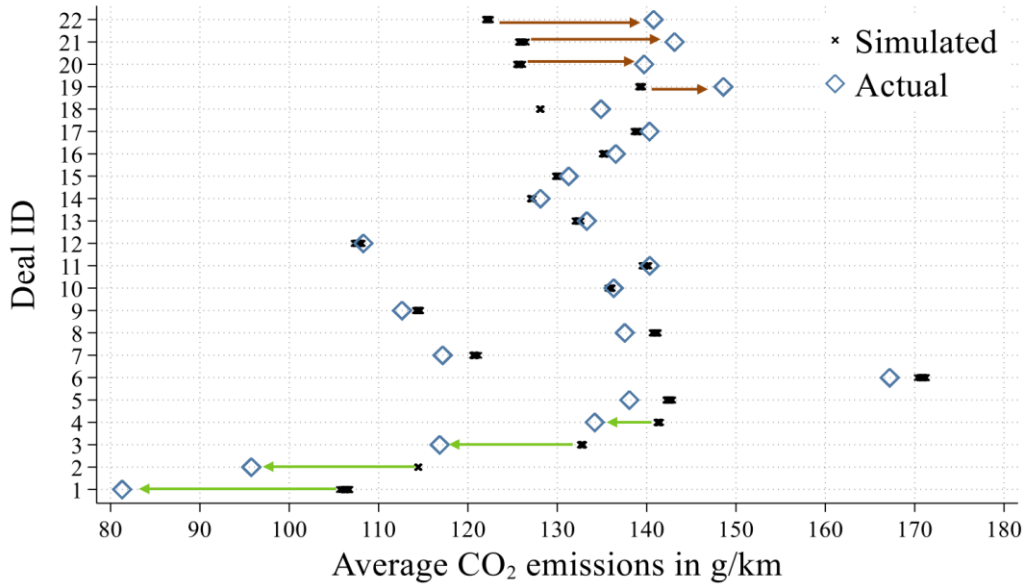
USMAN JAMIL, EUROPEAN DATAWAREHOUSE

"GREENNESS" OF AUTO ABS

PROSPECTUS STARTED TO INCLUDE SUSTAINABILITY DATA FROM 2016

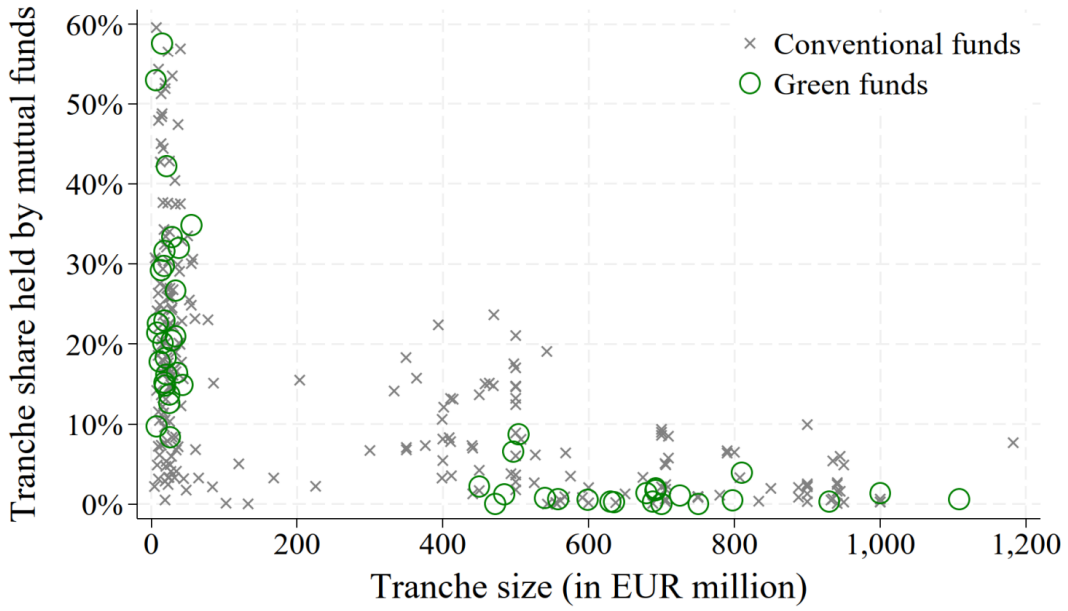


Source: Latino, Pelizzon, Riedel, and Wang (2025)



Note: simulations are based EEA's vehicle data, matched on country, year of registration, manufacturer, model, and fuel type

MUTUAL FUND DEMAND



Main findings

- MFs value transparency about the fuel type distribution of underlying collateral
- green MFs tend to hold larger exposures to AutoABS that are more transparent or composed of a larger share of EVs

CREDIT RISK

EV LOANS DEFAULT LESS, PARTICULARLY AMONG LOWER-INCOME BORROWERS

	Full sample		By income group		
VARIABLES			Low	Middle	High
EV	-1.154***	-0.432***	-0.396*	-0.218	-0.159
	[0.088]	[0.127]	[0.162]	[0.212]	[0.277]
Interest rate (%)	0.084***	0.058***	0.070***	0.056**	0.006
	[0.005]	[0.009]	[0.012]	[0.017]	[0.025]
Maturity (years)	0.181***	0.077***	0.077***	0.074**	0.031
	[0.004]	[0.009]	[0.011]	[0.016]	[0.025]
Debt-to-income (%)	0.001***	0.001***	0.001***	0.002***	0.002***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Fuel usage (kWh/100km)		0.009***	0.009***	0.009***	0.011***
		[0.001]	[0.002]	[0.003]	[0.003]
Observations	2,153,620	994,757	391,462	719,940	258,981
Pseudo R^2	0.126	0.165	0.169	0.169	0.165

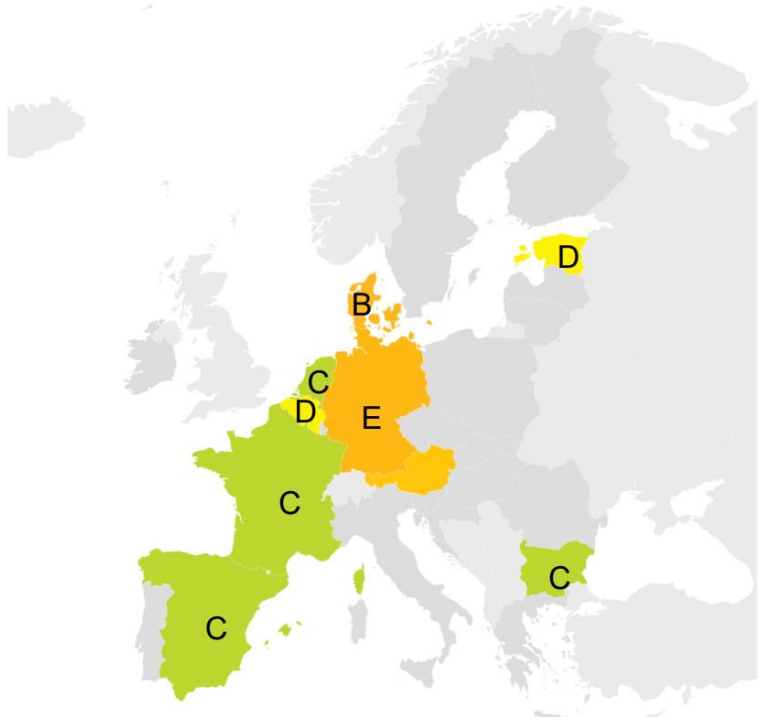
Notes: Logit regressions of NPL on borrower/loan controls. All specifications include manufacturer and lender FEs. Robust SE in brackets; ***, **, * denote 1%, 5%, 10%.

POTENTIAL SUSTAINABILITY PROXIES

CAN WE USE CAR LABELS AS SUSTAINABILITY PROXIES?

Car label

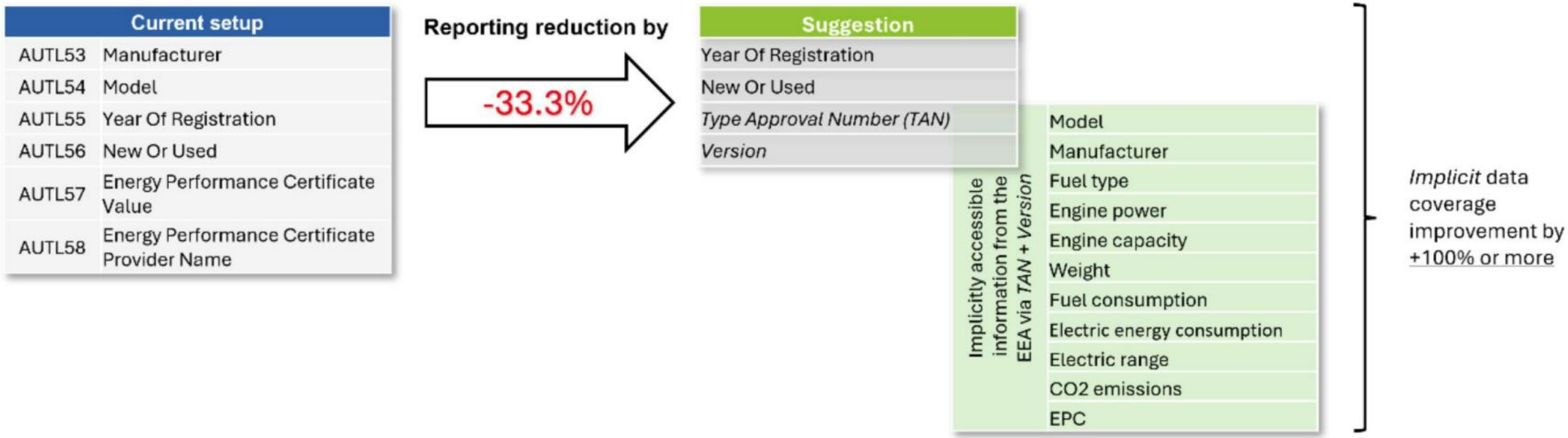
Rating heterogeneity of an SUV



Note: The labels refer to Volkswagen T-Roc 1.5 TSI (2022-2024), with a fuel consumption of 6.1 l/100km and CO2 emissions of 138 g/km. Car label Rating heterogeneity of an SUV
Source: Badenhoop and Riedel (2025)

VEHICLE IDENTIFIERS COULD BE A SOLUTION

THE EUROPEAN COMMISSION AIMS TO REDUCE THE NUMBER OF FIELDS IN THE TEMPLATES BY AT LEAST 35%



Source: Lindner and Riedel (2025)

LIST OF PUBLICATIONS

1 OF 2

- **Badenhoop, N., & Riedel, M. (2025)**
  Fragmented EU car labels: How to achieve consumer-friendly standardization and transparency? Accepted in the Journal of Consumer Policy
  https://doi.org/10.2139/ssrn.4994192

- **European DataWarehouse (2025)**
  A Standardised Methodology to Calculate Vehicle Emissions with CO2 (g/km) Values
  https://eurodw.eu/research_articles/a-standardised-methodology-to-calculatevehicle-emissions-with-co2-values

- **Hackmann, A., Lindner, V., Pelizzon, L., & Riedel, M. (2024)**
  Vehicle identifiers: The key to jump-starting the European Green Auto ABS market? SAFE White Paper No. 100.
  https://safefrankfurt.de/fileadmin/user_upload/editor_common/Policy_Center/SAFE_White_Paper_100.pdf

LIST OF PUBLICATIONS

2 OF 2

- **Latino, C., Pelizzon, L., & Riedel, M. (2025).**
  How to green the European auto ABS market? A literature survey. European Financial Management, 31(2), 615–638.
  https://doi.org/10.1111/eufm.12515

- **Latino, C., Pelizzon, L., Riedel, M., & Wang, Y. (2025).**
  Mutual funds' appetite for sustainability in European auto ABS. SAFE Working Paper 448.
  https://doi.org/10.2139/ssrn.5234973

- **Lindner, V. R., & Riedel, M. (2025).**
  From deletion to substitution: A smart regulatory path for EU securitisation reform. SAFE Policy Letter No. 109.
  https://safefrankfurt.de/fileadmin/user_upload/editor_common/Policy_Center/SAFE_Policy_Letter_109.docx.pdf

ENGAGE PROJECT ON MORTGAGE AND ENERGY EFFICIENCY

MICHELE COSTOLA, UNIVERSITÀ CA' FOSCARI VENEZIA

Results on Risk Mitigation and Energy Efficiency Correlation Analysis

Monica Billio
Michele Costola
Fausto Corradin
Iva Hristova
Chao Long Li
Mirnajaf Aliyev
Ali Ebdatian

EDW Q4 Research Update Webinar

December 16, 2025

Motivation

- Buildings account for about **40% of EU final energy consumption** and **36% of energy-related CO_2 emissions**; around **75% of the stock remains energy-inefficient**.
- The revised **EU 2030 energy-efficiency target** requires a **11.7% reduction in energy use**, Reinforcing the policy focus on building renovation.
- For **lenders and investors**, energy upgrades expand the **mortgage and retrofit financing market**.
- **Homebuyers** increasingly value energy efficiency, affecting **property prices** (discounts for inefficient homes) and **mortgage credit risk through energy costs**.
- This analysis focuses on the link between **energy efficiency**, **property values**, and **mortgage credit risk**.

Background on Energy Efficiency and Mortgage Credit Risk

- In the Netherlands, mortgages backed by **energy-efficient buildings** show **lower default risk** (Billio et al., 2022b).
- In Italy, **higher EPC ratings** are associated with **lower mortgage default probabilities** (Billio et al., 2022a).
- In the UK, **energy-efficient homes** are linked to **fewer mortgage arrears** (Guin et al., 2022).
- European evidence shows that **energy efficiency** is associated with **lower mortgage risk** and **higher collateral values** (EEFIG, 2022).
- In France and the Netherlands, **securitised mortgages** on **EPC A–C properties** exhibit **lower cumulative delinquencies** than **EPC F–G loans** (Thebault and Jamil, 2024).
- At the EU level, **green RMBS** and loans backed by **high-EPC collateral** show **lower delinquency and default rates** (Dragotto et al., 2025).

EE and the probability of default

Three main channels linking energy efficiency to default risk.

Personal characteristics

Choice of an EE building
(e.g., environmental consciousness)

Disposable Income

free up a borrower's disposable income
through lower utility bills

Dwelling value

lower loan-to-value ratio

Research questions and approach

- Study the relationship between **energy efficiency (EPC)** and **mortgage default risk**, building on **recent empirical evidence**.
- Use loan- and collateral-level data from the **European DataWarehouse (EDW)** covering **France**, **the Netherlands**, and **Rest of Europe** over **2021–2025**.
- Harmonise **EPC labels** and merge mortgage and collateral templates into a single pan-European dataset.
- Quantify the effect of energy efficiency using **portfolio analysis**, **logit models** for PD, and **Cox models** for time to default.
- Derive **policy-relevant implications** for sustainable finance and **disclosure practices** (ESMA, EU Taxonomy).

Data and sample

- Granular **loan- and collateral-level data** from the **European DataWarehouse (EDW)**, based on ESMA Annex II templates.
- Residential mortgage loans observed over **2021–2025** in three regions: **France**, **the Netherlands**, and **Rest of Europe** (Belgium, Austria, Portugal, Finland, Ireland, etc.).
- Loan (RREL) and collateral (RREC) templates merged using the *Original Underlying Exposure Identifier*; duplicates and inactive loans are removed, missing EPCs flagged.
- Final dataset includes about **531,000 loans** and **14 million loan-month observations**. Defaults are rare (≈**1.4%**), defined as **90+ days past due**.
- To address class imbalance, we construct a **balanced sample**: all defaulted loans plus a 1:1 stratified sample of non-defaults (by country and loan purpose).

Mortgage portfolio by country

- Portfolio is concentrated in **FR** and **NL** ($\approx 97\%$ of loans).
- Overall default rate is **low** ($\approx 1.4\%$), but there is **strong cross-country heterogeneity** (e.g. Spain vs NL).
- In what follows, we **focus on the Netherlands** in the descriptive statistics.

Country	Non-default	Default	Total	% of total
BE (Belgium)	2,929 (98.9%)	32 (1.1%)	2,961	0.6%
ES (Spain)	9,184 (87.8%)	1,276 (12.2%)	10,460	2.0%
FR (France)	**392,474 (98.7%)**	**5,155 (1.3%)**	**397,629**	**74.7%**
GB (United Kingdom)	3,833 (95.3%)	188 (4.7%)	4,021	0.8%
NL (Netherlands)	**115,975 (99.3%)**	**808 (0.7%)**	**116,783**	**22.0%**
Others	0 (0.0%)	120 (100.0%)	120	0.0%
Total	**524,395**	**7,579**	**531,974**	**100%**

Energy efficiency distribution - Netherlands

- The Dutch mortgage portfolio shows a **predominance of EPC A–C properties**, which together account for about **65% of loans**.
- Default rates are **very low across all EPC classes**, with limited variation and values generally below **1%**.

EPC category	Non-default (Cat%)	Default (Cat%)	Total	% of total
A	30,038 (99.61%)	118 (0.39%)	30,156	25.84%
B	15,984 (99.37%)	101 (0.63%)	16,085	13.78%
C	29,068 (99.32%)	199 (0.68%)	29,267	25.08%
D	12,255 (99.40%)	74 (0.60%)	12,329	10.56%
E	8,144 (99.04%)	79 (0.96%)	8,223	7.05%
F	9,560 (99.13%)	84 (0.87%)	9,644	8.26%
G	10,876 (99.26%)	81 (0.74%)	10,957	9.39%
OTHER	47 (100.0%)	0 (0.0%)	47	0.04%
Total	**115,972**	**736**	**116,708**	**100%**

Loan purpose - Netherlands

- Portfolio is dominated by **purchase** mortgages (PURC, 87% of loans), with **remortgages** (RMRT) accounting for about 8%.
- Construction and renovation loans are small in volume, but still show **low default rates** (all purposes below 2%).
- Slightly higher default rates for **renovation** and **equity release** hint at somewhat riskier borrower profiles or project risk.

Purpose	Non-default (Cat%)	Default (Cat%)	Total	% of total
CNST (Construction)	2,831 (99.12%)	25 (0.88%)	2,856	2.45%
EQRE (Equity Release)	475 (98.14%)	9 (1.86%)	484	0.41%
PURC (Purchase)	**101,412 (99.36%)**	**650 (0.64%)**	**102,062**	**87.39%**
OTHR (Other)	269 (97.11%)	8 (2.89%)	277	0.24%
RENV (Renovation)	2,005 (98.72%)	26 (1.28%)	2,031	1.74%
RMRT (Remortgage)	8,983 (99.01%)	90 (0.99%)	9,073	7.77%
Total	**115,975**	**808**	**116,783**	**100%**

Property type - Netherlands

- The Dutch portfolio is dominated by **detached/semi-detached houses** (RHOS, 86% of loans).
- **Flats/apartments** (RFLT) represent about 14% of the book, while partial-commercial properties (PCMM) are marginal.
- Default rates are **low across all property types**, with houses performing slightly better than flats.

Property type	Non-default (Cat%)	Default (Cat%)	Total	% of total
PCMM (Partial commercial)	689 (100.0%)	0 (0.0%)	689	0.59%
RFLT (Flat / apartment)	16,046 (99.09%)	148 (0.91%)	16,194	13.87%
RHOS (House)	**99,240 (99.37%)**	**633 (0.63%)**	**99,873**	**85.54%**
Total	**115,975**	**781**	**116,756**	**100%**

Employment status - Netherlands

- Most Dutch mortgages are to **private-sector employees** (EMUK, about **70%** of loans); **self-employed** (SFEM) and **pensioners** (PNNR) together account for about $\sim$**23%**.
- Default rates are **very low across all categories** (all $< 1\%$).

Employment status	Non-default (Cat%)	Default (Cat%)	Total	% of total
EMBL (Public sector)	0 (0.0%)	1 (100.0%)	1	0.00%
EMUK (Private sector)	**81,595 (99.19%)**	**666 (0.81%)**	**82,261**	**70.44%**
NOEM (No employment, legal entity)	1,732 (100.0%)	0 (0.0%)	1,732	1.48%
PNNR (Pensioner)	9,170 (99.66%)	31 (0.34%)	9,201	7.88%
SFEM (Self-employed)	17,782 (99.45%)	98 (0.55%)	17,880	15.31%
UNEM (Unemployed)	2,894 (99.86%)	4 (0.14%)	2,898	2.48%
OTHR (Other)	2,802 (99.72%)	8 (0.28%)	2,810	2.41%
Total	**115,975**	**808**	**116,783**	**100%**

Financial characteristics - overall sample

- **EE vs non-EE loans**, by **default status**.
- **Non-defaulted loans:**
  - EE borrowers have **higher income** (about €71k vs €56k).
  - They exhibit **lower initial DTI** (about 31% vs 34%) and **lower current LTV** (about 53% vs 60%).
  - EE loans have **slightly lower interest rates** (1.77% vs 1.87%) and **shorter original maturities** (about 264 vs 270 months).
- **Defaulted loans:**
  - EE borrowers still display **higher income** (about €62k vs €43k) and **higher collateral values** (about €174k vs €156k).
  - EE loans are associated with **slightly lower initial rates** (2.35% vs 2.55%) and **shorter maturities** (about 263 vs 279 months).
  - Despite starting from **somewhat higher original LTVs** (about 87% vs 84%), EE loans **default less frequently**.

Logit model

- We model the **probability of default** for loan i:

$$\Pr(\text{Default}_i = 1 \mid X_i) = p_i, \qquad \text{Default}_i \sim \text{Bernoulli}(p_i)$$

- Logistic specification:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \,\text{EE}_i + X_i'\gamma$$

  where:

  - EE_i = Energy efficiency indicator (EPC value),
  - X_i = controls for maturity–origination gap, property type, employment status, income, interest-rate type, etc.

- We estimate two specifications:

  - **Model (1)**: with EE (β_1 estimated),
  - **Model (2)**: without EE (benchmark).

Logit regression results

Type	Variable	β (with EE)	β (without EE)
Constant	Constant	-4.2857^{***}	-4.0139^{***}
		(0.9618)	(0.6308)
Energy efficiency	EE (EPC value, RREC10)	-0.6944^{***}	—
		(0.1741)	
Maturity–origination gap	Maturity–origination date	-0.8021^{*}	-0.7252^{*}
		(0.4524)	(0.4519)
Property type	Residential flat / apartment	0.7908^{***}	0.8818^{***}
		(0.1377)	(0.1353)
	Multifamily house	0.4181^{**}	0.3950^{**}
		(0.1519)	(0.1518)
Employment status	Self–employed	1.1283^{***}	1.1286^{***}
		(0.3421)	(0.3404)
	No employment	-0.6444^{**}	-0.6947^{**}
		(0.2876)	(0.2858)
	Student	0.3929^{**}	0.3806^{**}
		(0.1828)	(0.1821)
	Other	1.5378^{***}	1.5067^{***}
		(0.4562)	(0.4549)
Primary income	Borrower annual income	-0.2272^{***}	-0.2638^{***}
		(0.0675)	(0.0592)
Interest rate type	Fixed with future periodic resets	0.8693^{***}	0.8957^{***}
		(0.2601)	(0.2582)
Observations	Balanced sample: all defaults + 1:1 stratified subsample of non-defaults		

Effect of energy efficiency in the logit model

- Estimated coefficient on energy efficiency (model with EE):

$$\hat{\beta}_1 = -0.6944 \quad (\text{s.e. } 0.1741,\ p < 0.001).$$

- Corresponding **odds ratio**:

$$\exp(\hat{\beta}_1) \approx 0.50.$$

- Holding all other loan and borrower characteristics constant, **energy-efficient loans have about 50% lower odds of default** than non–EE loans.
- In practical terms, if 20 out of 1,000 non–EE loans default, we would expect roughly 10 out of 1,000 EE loans to default.
- The EE effect is **highly statistically significant** and **stable across specifications**, with other coefficients remaining very similar when EE is excluded.

Does energy efficiency improve model fit?

- We compare two logit specifications estimated on the **full sample** (256,603 loans; 350 defaults):
  - **Model with EE**: includes the EPC-based energy efficiency indicator,
  - **Model without EE**: excludes energy efficiency.
- Including **energy efficiency improves model fit and discrimination**, even in a low-default environment.

Statistic	**With EE**	**Without EE**
Number of observations	256,603	256,603
Number of defaults	350	350
Pseudo-R^2	0.0269	0.0172
AUC (ROC)	0.6841	0.6809
Log-likelihood	-2587.4	-2613.2

Cox proportional hazards model

- Let T_i denote the time (in months) until default for loan i. The survival probability is

$$S_i(t) = \Pr(T_i > t),$$

  i.e. the probability that the loan is still performing at time t.

- We model the **default hazard** (instantaneous default risk) as

$$h_i(t) = h_0(t) \exp\left(\beta_1 \, \mathrm{EE}_i + X_i'\gamma\right),$$

  where:

  - $h_0(t)$ captures the baseline default risk over time,
  - EE_i denotes the energy-efficiency category (Low, Medium, High, Other),
  - X_i includes loan and borrower controls (maturity, income, employment status, property type, interest-rate type, etc.).

- Results are reported as **hazard ratios**:

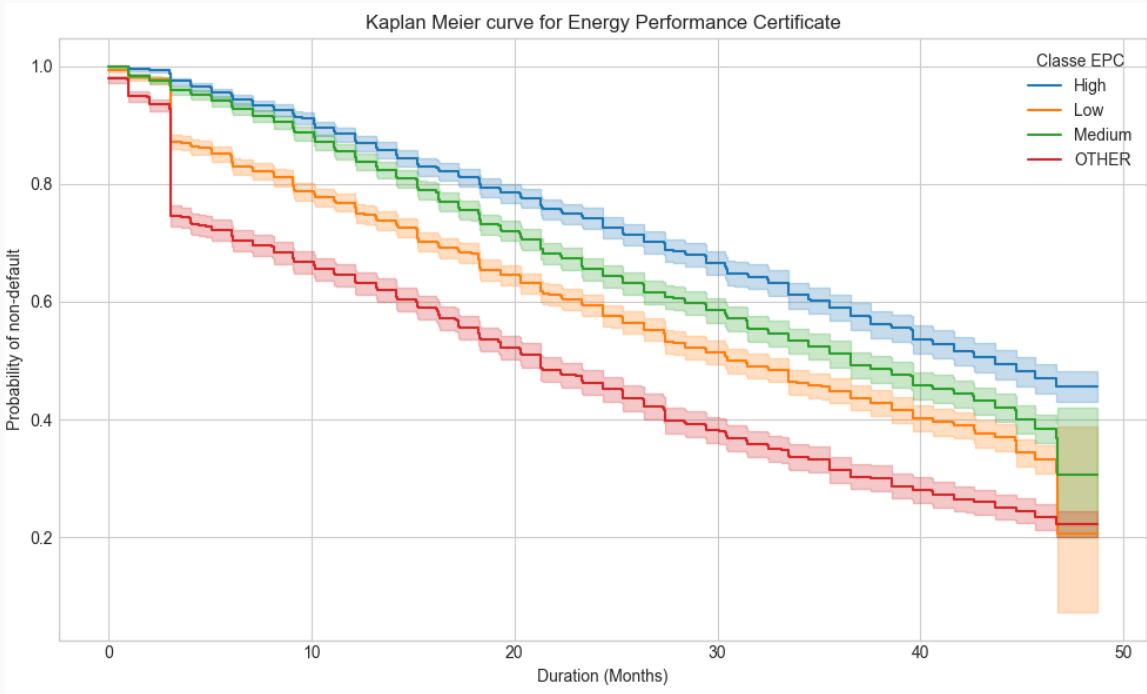
$$\exp(\beta_1) < 1 \quad \Rightarrow \quad \text{energy-efficient loans default more slowly over time.}$$

Survival by energy efficiency (Kaplan–Meier)

- Mortgages are grouped into four **energy-efficiency classes**: High (A–B), Medium (C–D), Low (E–G), and Other.
- Kaplan–Meier curves show a **clear ranking across groups**: loans backed by **highly energy-efficient properties** remain performing for longer, followed by Medium and Low EE loans.

Median time to default

EE group	Months
High	47
Medium	39
Low	29
Other	18



Kaplan–Meier survival curves by energy-efficiency class.

Cox regression results

Type	Variable	(1)	(2)	(3)	(4)
Energy efficiency (vs High EE)					
	Low EE	2.14***	1.98***	1.86***	1.43***
	Medium EE	1.27***	1.25***	1.24***	1.23***
	Other	4.71***	2.98***	3.54***	6.61***
Loan characteristics					
	Original term		1.00***	1.00***	1.00***
	Current interest rate		1.22***	1.22***	1.26***
	Current loan-to-value		1.00***	1.00***	1.00***
	Debt-to-income ratio		1.00***	1.00***	1.00***
Fixed effects					
	Year FE (vs 2021)	No	No	Yes	Yes
	Country FE (vs BE)	No	No	No	Yes
Summary statistics					
	Observations	10,690	10,690	10,690	10,690
	Events observed	5,345	5,345	5,345	5,345
	C-index	0.61	0.65	0.67	0.69

Entries are hazard ratios (HRs). High EE (EPC A–B) is the reference group.

Conclusions and policy messages

- **Energy efficiency is a relevant credit risk factor:** mortgages backed by more energy-efficient homes exhibit systematically lower default risk.
- Including EE information **improves PD estimation**, consistent with borrowers facing lower energy costs, lower debt burdens, and stronger repayment capacity.
- The relationship between EE and default risk is **stable over time**, suggesting that energy performance captures a persistent dimension of borrower creditworthiness.
- **Building on the existing ESMA framework**, more granular EE information (e.g. EPC label, renovation year) could further support investors in assessing the energy-efficiency composition of mortgage pools.
- **Continued alignment of EE disclosures** across ESMA, ESAs–ECB, the EU Taxonomy and SFDR can help ensure consistent interpretation and improve cross-country and cross-institution comparability of **credit risk** and **green exposure**.

Thank you for your attention.

References

Monica Billio, Michele Costola, Loriana Pelizzon, Francesco Portioli, Max Riedel, and Daniele Vergari. Creditworthiness and buildings' energy efficiency in the mortgage market. In *Climate Investing: New Strategies and Implementation Challenges*, pages 325–346. ISTE Ltd and John Wiley & Sons, Inc., London and Hoboken, 2022a.

Monica Billio, Michele Costola, Loriana Pelizzon, and Max Riedel. Buildings' energy efficiency and the probability of mortgage default: The dutch case. *The Journal of Real Estate Finance and Economics*, 65(3):419–450, 2022b.

Massimo Dragotto, Alfonso Dufour, Samuele Segato, and Simone Varotto. Energy efficiency and the default risk of securitised residential mortgages. ICMA Centre, Henley Business School, 2025.

EEFIG. The quantitative relationship between energy efficiency improvements and lower probability of default of associated loans and increased value of the underlying assets: Final report on risk assessment. Technical report, European Commission, Directorate-General for Energy, Luxembourg, 2022.

Benjamin Guin, Perttu Korhonen, and Sidharth Moktan. Risk differentials between green and brown assets? *Economics Letters*, 213:110320, 2022.

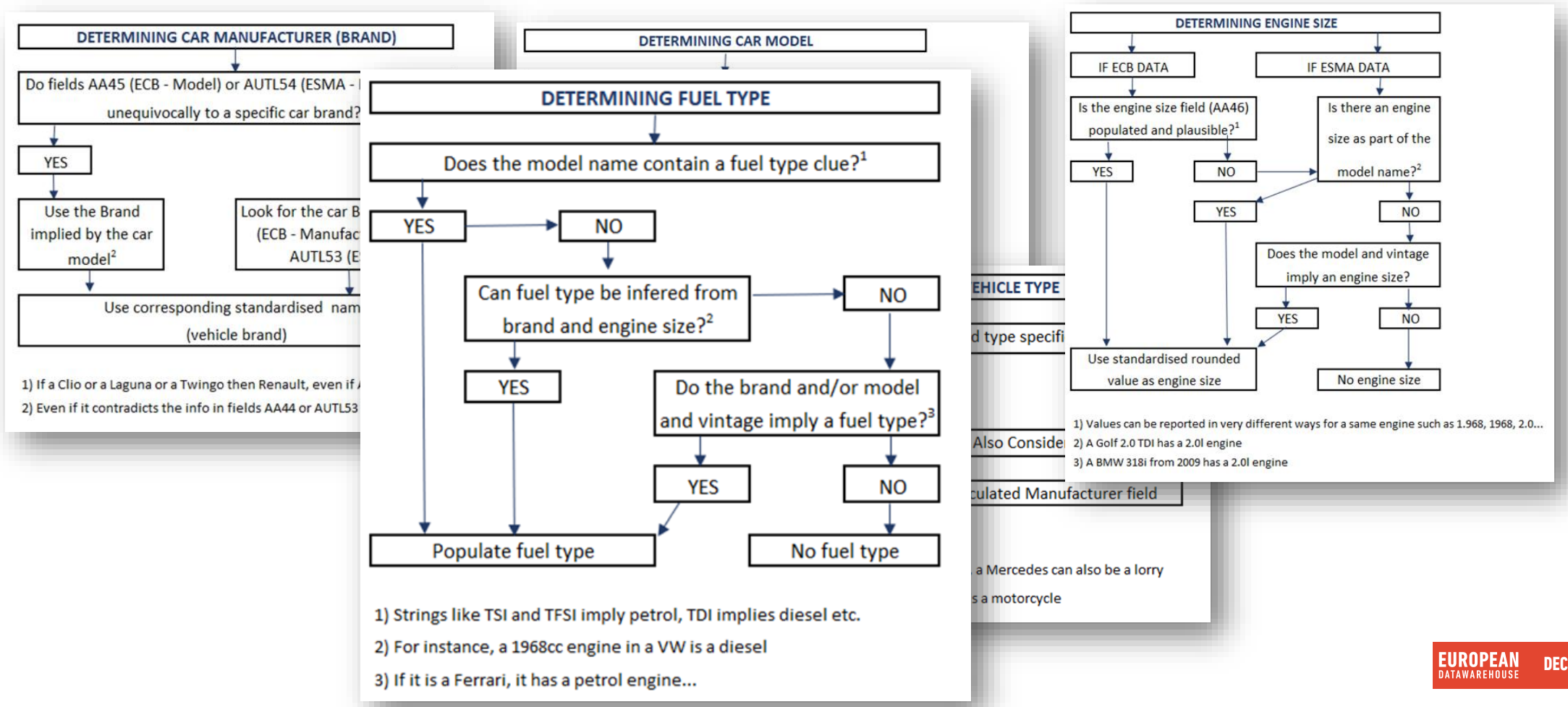
Ludovic Thebault and Usman Jamil. Is energy efficiency credit relevant? In *EMF Hypostat 2024*, pages 11–16. 2024. European Mortgage Federation (EMF) article based on European DataWarehouse loan-level data.

AI USE FOR CAR FUEL CLASSIFICATION

INA KRAPP, SAFE

CAN OUR GAS-CALCULATED FIELDS BE DONE MORE EFFICIENTLY WITH AI?

PRODUCING THE QUERIES THAT MADE GAS POSSIBLE WAS VERY TIME AND WORK INTENSIVE. CAN AI HELP?



AI use for car fuel classification

Leibniz Institute for Financial Research SAFE

Ina Krapp

Large language models:

- A recent, but widely used form of AI (ChatGPT, Gemini…)
- Very good in analyzing and replicating human speech patterns (Chatbot) or programming
- Recent advantages in Image/Video Analysis and Generation
- Can we ask it what the fuel type a car uses?

The use case:

- Data: 329320 entries, manually created by the EDW
- Challenge: Infer fuel types from text like ‘3008 HYBRID4 2.0 HDI 163CH’ and year

AUTL54_model	AUTL55_year_of_reg
207 1.6 HDI +ACC	2012
208 AFFAIRE 1.6 e- HDI	2014
3008 HYBRID4 2.0 HDI 163CH	2013
A1 1.4 TFSI 185CH S TRONIC	2011

How does AI work?

- AI programs are trained: A model is given input and output and ‘figures out’ the patterns from training data
- This is a different approach from deterministic programs, where the patterns are set explicitly
- AI is often used when rules are unknown - if we knew any electric car’s name started with ‘Electric’, we would not need AI
- The larger the number of parameters, the more precise can it construct patterns - but the more expensive will it be to use

ChatGPT vs. BERT:

Generative LLM:
Can create very flexible texts

This car uses petrol.

This car uses fuel. Or maybe it is electric? I am not sure...

Most cars from this manufacturer are using petrol, but this model is electric.

Classification LLM:
Selects from a fixed number of categories

1

2

3

2

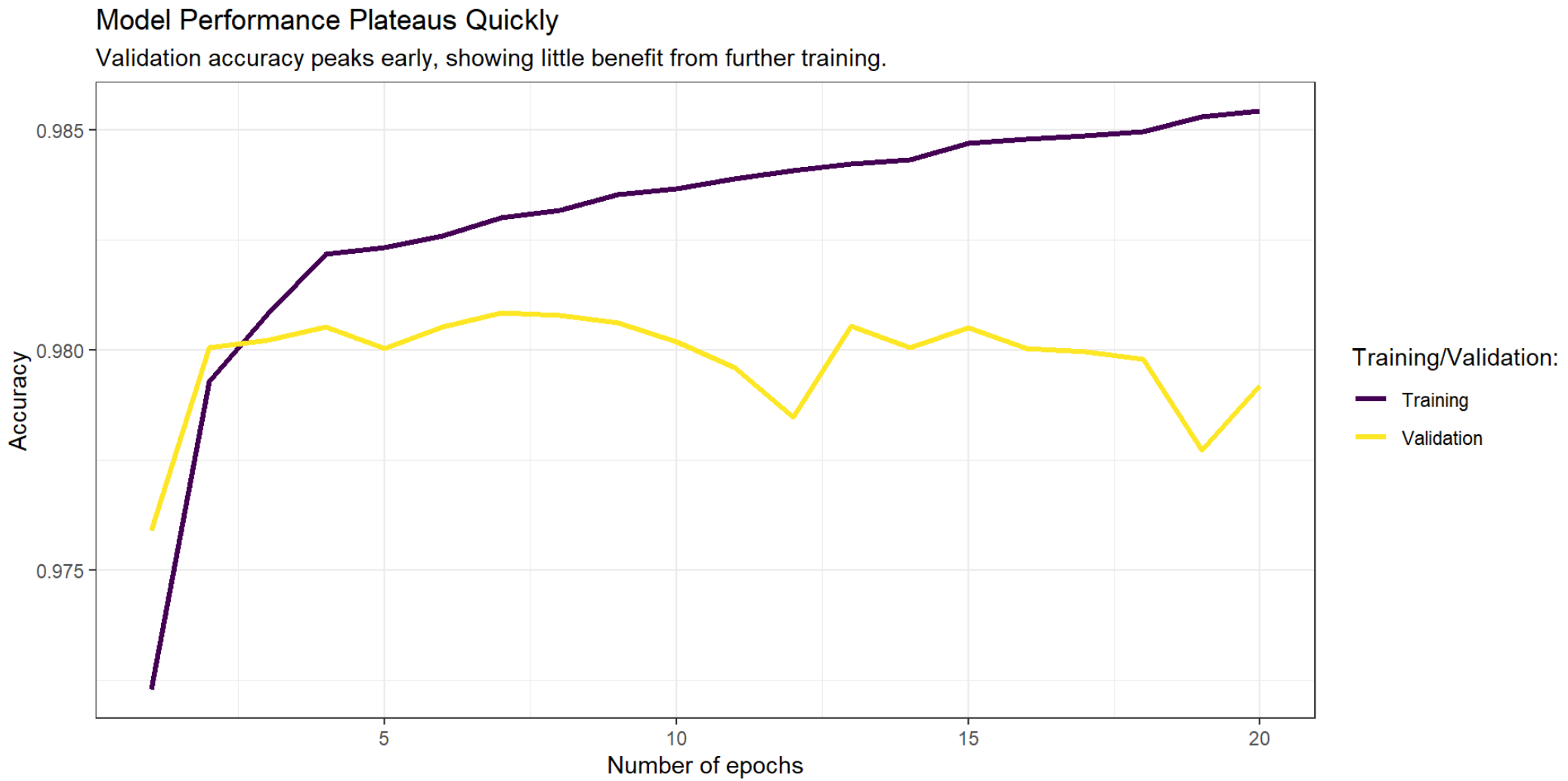
Costs of AI:

- Computing Power: AI typically runs on the graphics card - expensive hardware increases speed considerably
- Skills: Programming AI is simpler now than a few years ago, but still requires technical knowledge)
- Data: Large datasets are required to train AI
- Time: Training can take very long, applying the AI is typically considerably faster

Training of modernBERT:

Model size	Validation Accuracy	Test Accuracy	Training Time	Prediction Time
Base (0.1 B)	0.9795%	0.9796%	8H 25M 10S	20M 56S
Large (0.4 B)	0.9807%	0.9811%	22H 49M 26S	35M 56S

Accuracy by training time:



What types of errors occur?

- Precision: Is a car labeled ‘Electric’ really electric?
- Recall: If a car in the data is electric, was it labeled ‘Electric’?
- f1-score: Combines both measures

	precision	recall	f1-score	support
DIESEL	0.99	0.98	0.99	44,169
ELECTRIC	**1.00**	**0.85**	0.92	**26**
GAS	1.00	0.99	1.00	546
HYBRID	0.96	0.99	0.98	827
PETROL	0.96	0.98	0.97	20,201
PLUG-IN-HYBRID	0.98	0.97	0.97	95

Confusion Matrix: Which cars get confused?

	Pred: DIESEL	Pred: ELECTRIC	Pred: GAS	Pred: HYBRID	Pred: PETROL	Pred: PLUG-IN-HYBRID
Actual: DIESEL	43,272	0	0	4	**893**	0
Actual: ELECTRIC	**2**	22	0	0	**1**	**1**
Actual: GAS	0	0	542	0	4	0
Actual: HYBRID	0	0	0	821	6	0
Actual: PETROL	**303**	0	0	26	19,871	1
Actual: PLUG-IN-HYBRID	0	0	0	0	3	92

Potential issues:

- The baseline problem: AI often is compared against the manual data that is also used for training. What about errors in the manual data?
- The error type problem: We might care more about some types of errors than others
- In our case: If a car is electric or not may be more important than if it uses Petrol or Diesel

Broader concerns:

- AI follows patterns - what if patterns change?
- AI may learn from previous years: A Tesla car is always electric. What if Elon Musk decides to produce Petrol-based cars starting next year?
- Different patterns between training data and application data are possibly one of the most common reasons for AI failure.
- Explainable AI (AI from which it can be seen how the patterns were constructed) is still in its early stages

References & Acknowledgements

Models:

modernBERT models from Answer.ai, published under the Apache 2.0 License: https://doi.org/10.48550/arXiv.2412.13663

Key Software & Libraries:

```
python
transformers
torch
scikit-learn
pandas
R, ggplot2, dplyr, knitr
```

Q&A


WE WISH YOU A MERRY CHRISTMAS
AND AN EXCELLENT 2026!

THANK YOU

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PROXY DATA STUDIES

PROXY DATA TO COMPLY WITH ARTICLE 22(1) FOR THE STS TRANSACTIONS

EUROPEAN DATAWAREHOUSE CAN HELP YOUR ORGANISATION COMPLY WITH RELEVANT PERFORMANCE REQUIREMENTS

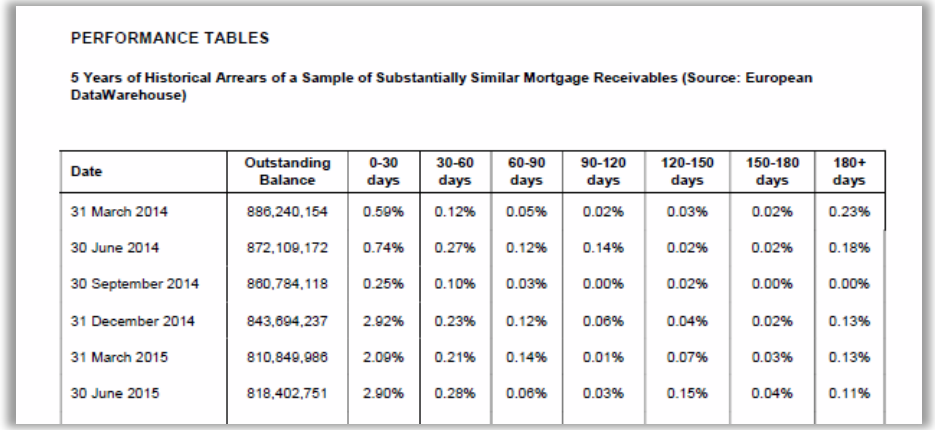
- With over 1300 transactions, EDW offers solutions for the issuers/originators/SSPEs to comply with the STS Requirements relating to transparency
- EDW can perform on-demand SQL queries to extract historical performance data from its database across asset classes for a period of at least five years. The performance data includes historical arrears, defaults for exposures similar to those being securitised.

L 347/62 EN Official Journal of the European Union 28.12.2017

Article 22

Requirements relating to transparency

1. The originator and the sponsor shall make available data on static and dynamic historical default and loss performance, such as delinquency and default data, for substantially similar exposures to those being securitised, and the sources of those data and the basis for claiming similarity, to potential investors before pricing. Those data shall cover a period of at least five years.



PERFORMANCE TABLES

5 Years of Historical Arrears of a Sample of Substantially Similar Mortgage Receivables (Source: European DataWarehouse)

Date	Outstanding Balance	0-30 days	30-60 days	60-90 days	90-120 days	120-150 days	150-180 days	180+ days
31 March 2014	886,240,154	0.59%	0.12%	0.05%	0.02%	0.03%	0.02%	0.23%
30 June 2014	872,109,172	0.74%	0.27%	0.12%	0.14%	0.02%	0.02%	0.18%
30 September 2014	860,784,118	0.25%	0.10%	0.03%	0.00%	0.02%	0.00%	0.00%
31 December 2014	843,694,237	2.92%	0.23%	0.12%	0.06%	0.04%	0.02%	0.13%
31 March 2015	810,849,986	2.09%	0.21%	0.14%	0.01%	0.07%	0.03%	0.13%
30 June 2015	818,402,751	2.90%	0.28%	0.06%	0.03%	0.15%	0.04%	0.11%

PROXY DATA PROCESS

5 STAGE PROCESS DESIGNED FOR DATA SET OPTIMISATION

INITIAL COMMUNICATION

EDW and the client identify and discuss any extraordinary characteristics of the desired pool to be securitised. For instance:

- Origination years
- Occupancy type
- Interest rate type
- Guarantee type etc.

DEALS SELECTION

EDW selects a list of deals based on:

- **completeness of data**
- **results of data quality checks**
- **the pool characteristics discussed**

The list of deals is then shared, and modified based on client feedback

PROXY LOANS SELECTION

A subset of the underlying loans (based on the characteristics portfolio to be securitised) from the selected deals are taken as proxy loans.

Their historical performance data is compiled.

edcode	deal name	vintage
RMBSXX12345678912XXXX1	ABC 2014	2014
RMBSXX12345678912XXXX1	XYZ 2014	2014
RMBSXX12345678912XXXX1	ABC 2015	2015
RMBSXX12345678912XXXX1	XYZ 2015	2015
RMBSXX12345678912XXXX1	ABC 2016	2016
RMBSXX12345678912XXXX1	XYZ 2016	2016
RMBSXX12345678912XXXX1	ABC 2017	2017
RMBSXX12345678912XXXX1	XYZ 2017	2017
RMBSXX12345678912XXXX1	ABC 2018	2018
RMBSXX12345678912XXXX1	XYZ 2018	2018
RMBSXX12345678912XXXX1	ABC 2019	2019
RMBSXX12345678912XXXX1	XYZ 2019	2019

ADJUSTMENTS TO THE DATA

Dataset from each selected deal is scrutinised further for quality

Any idiosyncratic reporting practices in a deal are adjusted to one standard.

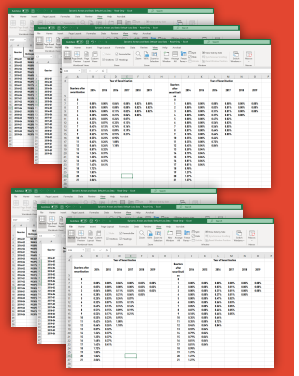
Any outlying results are investigated and discussed with the relevant EDW analyst

FINAL PERF. DATASET

First generation EDQC launched

Rules based LLD analysis implemented for all asset classes

RESULT: PROXY DATA



PROXY LOANS SELECTION AND ADJUSTMENTS TO THE DATA

BESPOKE ADJUSTMENTS

Prior to merging datasets from different deals, **each dataset is scrutinised further for data quality.** Examples include: **loan Identifier changes**, **duplicate data**, **dropped loans**, **decimal point issues**

Any idiosyncratic reporting practices of a unique deal are adjusted. Examples include: **default definition, reporting of Months in Arrears, reporting of Inactive loans**

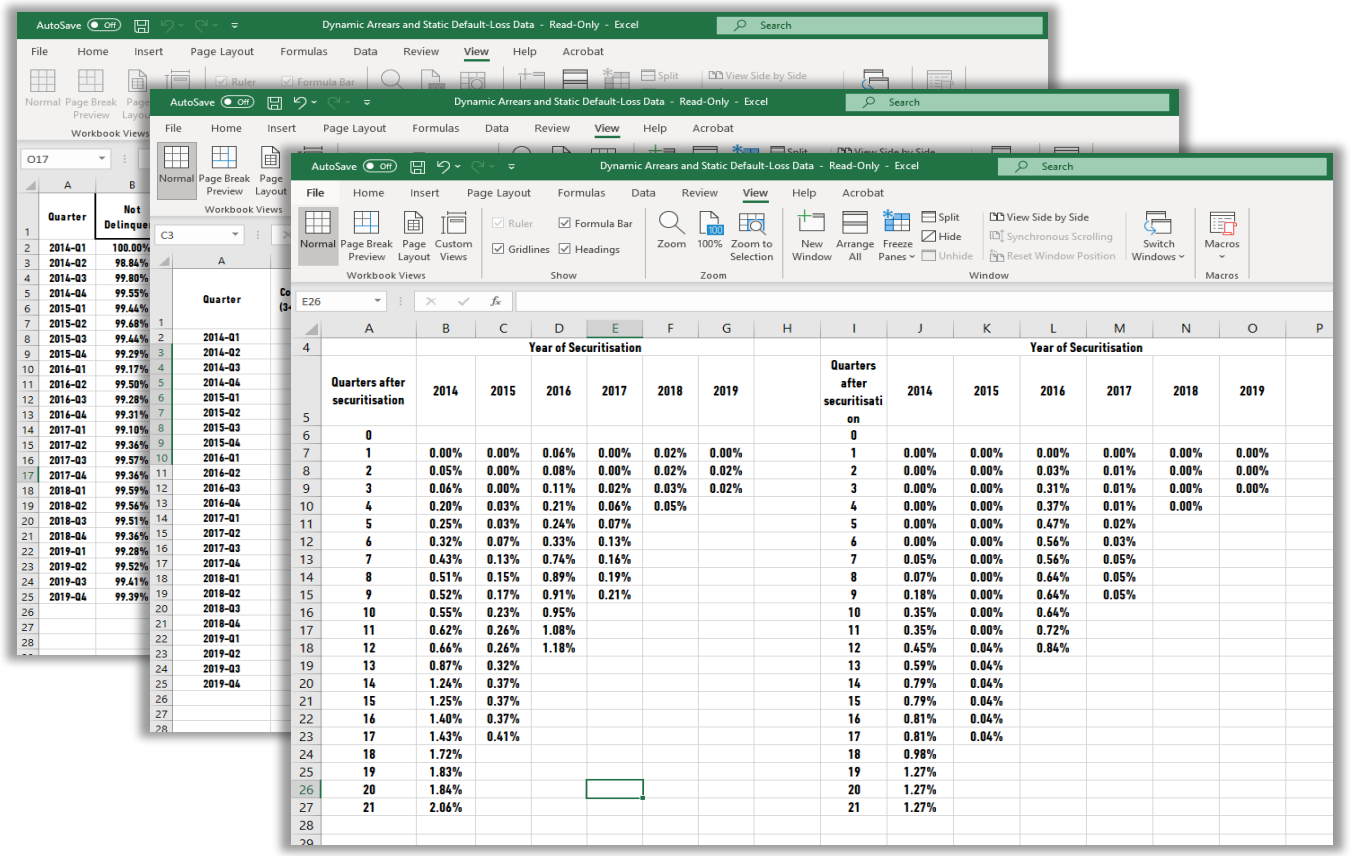
Any out of the ordinary results are investigated and discussed with the relevant Deal Analyst (e.g. high repurchases, zero defaults etc.) Investor Reports and other transaction documentation is referred to for reconciliation.

If needed, **complementing statistics are included as part of the final performance dataset.**

PROXY DATA LOAN SELECTION SUBSET SAMPLE

edcode	deal name	vintage
RMBSXX12345678912XXXX1	ABC 2014	2014
RMBSXX12345678912XXXX1	XYZ 2014	2014
RMBSXX12345678912XXXX1	ABC 2015	2015
RMBSXX12345678912XXXX1	XYZ 2015	2015
RMBSXX12345678912XXXX1	ABC 2016	2016
RMBSXX12345678912XXXX1	XYZ 2016	2016
RMBSXX12345678912XXXX1	ABC 2017	2017
RMBSXX12345678912XXXX1	XYZ 2017	2017
RMBSXX12345678912XXXX1	ABC 2018	2018
RMBSXX12345678912XXXX1	XYZ 2018	2018
RMBSXX12345678912XXXX1	ABC 2019	2019
RMBSXX12345678912XXXX1	XYZ 2019	2019

RESULT: FINAL PROXY DATA SAMPLE



Quarters after securitisation	Year of Securitisation					
	2014	2015	2016	2017	2018	2019
0						
1	0.00%	0.00%	0.06%	0.00%	0.02%	0.00%
2	0.05%	0.00%	0.08%	0.00%	0.02%	0.02%
3	0.06%	0.00%	0.11%	0.02%	0.03%	0.02%
4	0.20%	0.03%	0.21%	0.06%	0.05%	
5	0.25%	0.03%	0.24%	0.07%		
6	0.32%	0.07%	0.33%	0.13%		
7	0.43%	0.13%	0.74%	0.16%		
8	0.51%	0.15%	0.89%	0.19%		
9	0.52%	0.17%	0.91%	0.21%		
10	0.55%	0.23%	0.95%			
11	0.62%	0.26%	1.08%			
12	0.66%	0.26%	1.18%			
13	0.87%	0.32%				
14	1.24%	0.37%				
15	1.25%	0.37%				
16	1.40%	0.37%				
17	1.43%	0.41%				
18	1.72%					
19	1.83%					
20	1.84%					
21	2.06%					

Quarters after securitisation	Year of Securitisation					
	2014	2015	2016	2017	2018	2019
0						
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.03%	0.01%	0.00%	0.00%
3	0.00%	0.00%	0.31%	0.01%	0.00%	0.00%
4	0.00%	0.00%	0.37%	0.01%	0.00%	
5	0.00%	0.00%	0.47%	0.02%		
6	0.00%	0.00%	0.56%	0.03%		
7	0.05%	0.00%	0.56%	0.05%		
8	0.07%	0.00%	0.64%	0.05%		
9	0.18%	0.00%	0.64%	0.05%		
10	0.35%	0.00%	0.64%			
11	0.35%	0.00%	0.72%			
12	0.45%	0.04%	0.84%			
13	0.59%	0.04%				
14	0.79%	0.04%				
15	0.79%	0.04%				
16	0.81%	0.04%				
17	0.81%	0.04%				
18	0.98%					
19	1.27%					
20	1.27%					
21	1.27%					

RESULT: FINAL PROXY DATA SAMPLE

DYNAMIC ARREARS AND DEFAULTS

	A	B	C	D	E	F	G	H	I	J	K
1	Quarter	Not Delinquent	0 – 30 days	30 – 60 days	60 – 90 days	90 – 120 days	120 – 150 days	150 – 180 days	180+ days	Balance of New loans added	
2	2014-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
3	2014-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
4	2014-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
5	2014-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
6	2015-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
7	2015-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
8	2015-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
9	2015-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
10	2016-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
11	2016-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
12	2016-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
13	2016-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
14	2017-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
15	2017-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
16	2017-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
17	2017-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
18	2018-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
19	2018-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
20	2018-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
21	2018-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
22	2019-Q1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
23	2019-Q2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
24	2019-Q3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
25	2019-Q4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
26											

	A	B	C
1	Quarter	Constant Default Rate (3+ months definition)	Constant Default Rate (Transaction definition)
2	2014-Q1		
3	2014-Q2	X.XX%	X.XX%
4	2014-Q3	X.XX%	X.XX%
5	2014-Q4	X.XX%	X.XX%
6	2015-Q1	X.XX%	X.XX%
7	2015-Q2	X.XX%	X.XX%
8	2015-Q3	X.XX%	X.XX%
9	2015-Q4	X.XX%	X.XX%
10	2016-Q1	X.XX%	X.XX%
11	2016-Q2	X.XX%	X.XX%
12	2016-Q3	X.XX%	X.XX%
13	2016-Q4	X.XX%	X.XX%
14	2017-Q1	X.XX%	X.XX%
15	2017-Q2	X.XX%	X.XX%
16	2017-Q3	X.XX%	X.XX%
17	2017-Q4	X.XX%	X.XX%
18	2018-Q1	X.XX%	X.XX%
19	2018-Q2	X.XX%	X.XX%
20	2018-Q3	X.XX%	X.XX%
21	2018-Q4	X.XX%	X.XX%
22	2019-Q1	X.XX%	X.XX%
23	2019-Q2	X.XX%	X.XX%
24	2019-Q3	X.XX%	X.XX%
25	2019-Q4	X.XX%	X.XX%
26			

RESULT: FINAL PROXY DATA SAMPLE

STATIC DEFAULT AND LOSS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																								
2		Cumulative Default Rates (3+ months definition)								Cumulative Default Rates (transaction definition)								Cumulative Loss Rates (transaction definition)						
3																								
4		Year of Securitisation								Year of Securitisation								Year of Securitisation						
5	Quarters after securitisation	2014	2015	2016	2017	2018	2019		Quarters after securitisation	2014	2015	2016	2017	2018	2019		Quarters after securitisation	2014	2015	2016	2017	2018	2019	
6	0								0								0							
7	1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		1	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
8	2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		2	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
9	3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		3	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%	
10	4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			4	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		
11	5	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			5	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			5	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		
12	6	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			6	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%			6	X.XX%	X.XX%	X.XX%	X.XX%	X.XX%		
13	7	X.XX%	X.XX%	X.XX%	X.XX%				7	X.XX%	X.XX%	X.XX%	X.XX%				7	X.XX%	X.XX%	X.XX%	X.XX%			
14	8	X.XX%	X.XX%	X.XX%	X.XX%				8	X.XX%	X.XX%	X.XX%	X.XX%				8	X.XX%	X.XX%	X.XX%	X.XX%			
15	9	X.XX%	X.XX%	X.XX%	X.XX%				9	X.XX%	X.XX%	X.XX%	X.XX%				9	X.XX%	X.XX%	X.XX%	X.XX%			
16	10	X.XX%	X.XX%	X.XX%					10	X.XX%	X.XX%	X.XX%					10	X.XX%	X.XX%	X.XX%				
17	11	X.XX%	X.XX%	X.XX%					11	X.XX%	X.XX%	X.XX%					11	X.XX%	X.XX%	X.XX%				
18	12	X.XX%	X.XX%	X.XX%					12	X.XX%	X.XX%	X.XX%					12	X.XX%	X.XX%	X.XX%				
19	13	X.XX%	X.XX%						13	X.XX%	X.XX%						13	X.XX%	X.XX%					
20	14	X.XX%	X.XX%						14	X.XX%	X.XX%						14	X.XX%	X.XX%					
21	15	X.XX%	X.XX%						15	X.XX%	X.XX%						15	X.XX%	X.XX%					
22	16	X.XX%	X.XX%						16	X.XX%	X.XX%						16	X.XX%	X.XX%					
23	17	X.XX%	X.XX%						17	X.XX%	X.XX%						17	X.XX%	X.XX%					
24	18	X.XX%							18	X.XX%							18	X.XX%						
25	19	X.XX%							19	X.XX%							19	X.XX%						
26	20	X.XX%							20	X.XX%							20	X.XX%						
27	21	X.XX%							21	X.XX%							21	X.XX%						
28																								