

WINTER RESEARCH UPDATE

14 DECEMBER 2023



ON TODAY'S CALL



DR. CHRISTIAN THUN
CHIEF EXECUTIVE OFFICER,
EUROPEAN DATAWAREHOUSE

✉ christian.thun@eurodw.eu



LUDOVIC THEBAULT, PHD
HEAD OF RESEARCH,
EUROPEAN DATAWAREHOUSE

✉ ludovic.thebault@eurodw.eu



USMAN JAMIL
RESEARCH MANAGER
EUROPEAN DATAWAREHOUSE

✉ usman.jamil@eurodw.eu



YANIS BOUZIDI
QUANTITATIVE ANALYST
BANQUE DE FRANCE

✉ yanis.bouzidi@banque-france.fr

AGENDA

- **WELCOME AND INTRODUCTION**
DR. CHRISTIAN THUN, EUROPEAN DATAWAREHOUSE
- **EFFECTS OF CLIMATE RISK ON ABS VALUATION AND LIQUIDITY RISK**
YANIS BOUZIDI, BANQUE DE FRANCE
- **EPC DISCLOSURE IN EUROPEAN MORTGAGE LOANS**
USMAN JAMIL, EUROPEAN DATAWAREHOUSE
- **EPC DISCLOSURE IN EUROPEAN AUTO LOANS**
USMAN JAMIL, EUROPEAN DATAWAREHOUSE
- **RMBS LOANS PERFORMANCE UPDATE**
USMAN JAMIL, EUROPEAN DATAWAREHOUSE
- **USING EDW DATA FOR ACADEMIC RESEARCH**
LUDOVIC THEBAULT, PHD, EUROPEAN DATAWAREHOUSE
- **Q & A**

EFFECTS OF CLIMATE RISK ON ABS VALUATION AND LIQUIDITY RISK

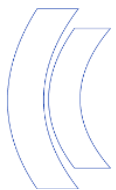
Effect of climate risk on ABS valuation and liquidation risk

Yanis Bouzidi

Risk management Directorate

Risk Analysis and Eurosystem Pricing Division

14 December 2023



A CENTRALISED PRICING HUB FOR COLLATERAL VALUATION

The **Common Eurosystem Pricing Hub (CEPH)**, developed and operated by the Eurosystem, provides the Eurosystem with a unique price per asset per business day that is used by all Eurosystem central banks **to value eligible marketable assets submitted as collateral** in Eurosystem credit operations.

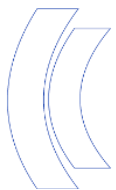
To define these unique Eurosystem prices, the CEPH collects market prices and defines the most reliable one on a given business day. In the absence of a **reliable market price** for a particular marketable asset on the business day preceding the valuation date, the CEPH calculates a **theoretical price**.

The value of a marketable asset is calculated on the basis of this unique Eurosystem price on the business day preceding the valuation date.

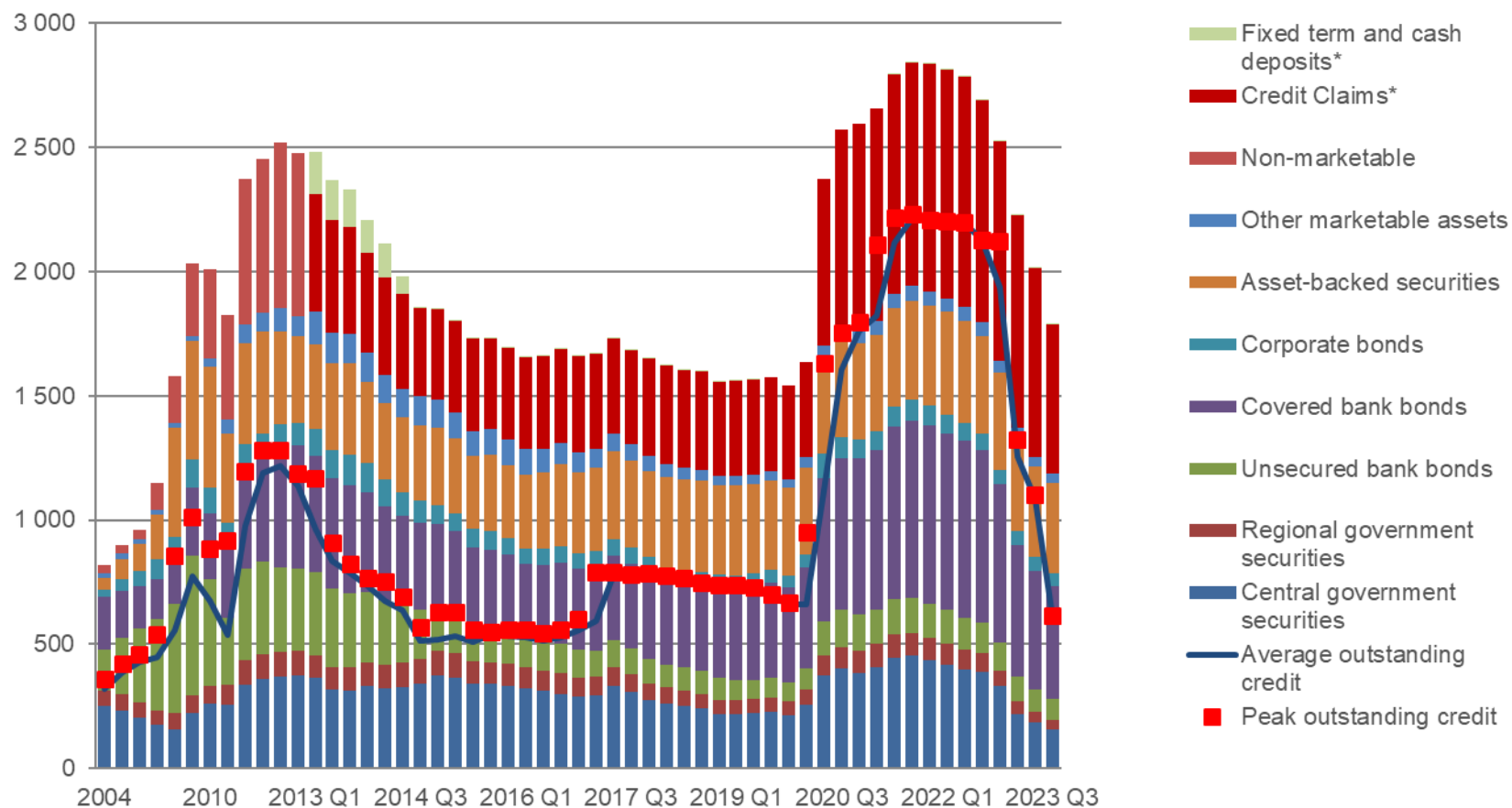
The CEPH started its marketable assets operations on 24 September 2012.

Banque de France CEPH team has a more specific **focus on ABS valuation**.

CEPH is a reliable, integrated, resilient, proprietary system ensuring daily prices for collateral marketable assets

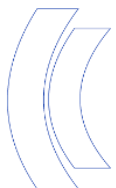


ABS AS COLLATERAL IN EUROSISTEM CREDIT OPERATIONS

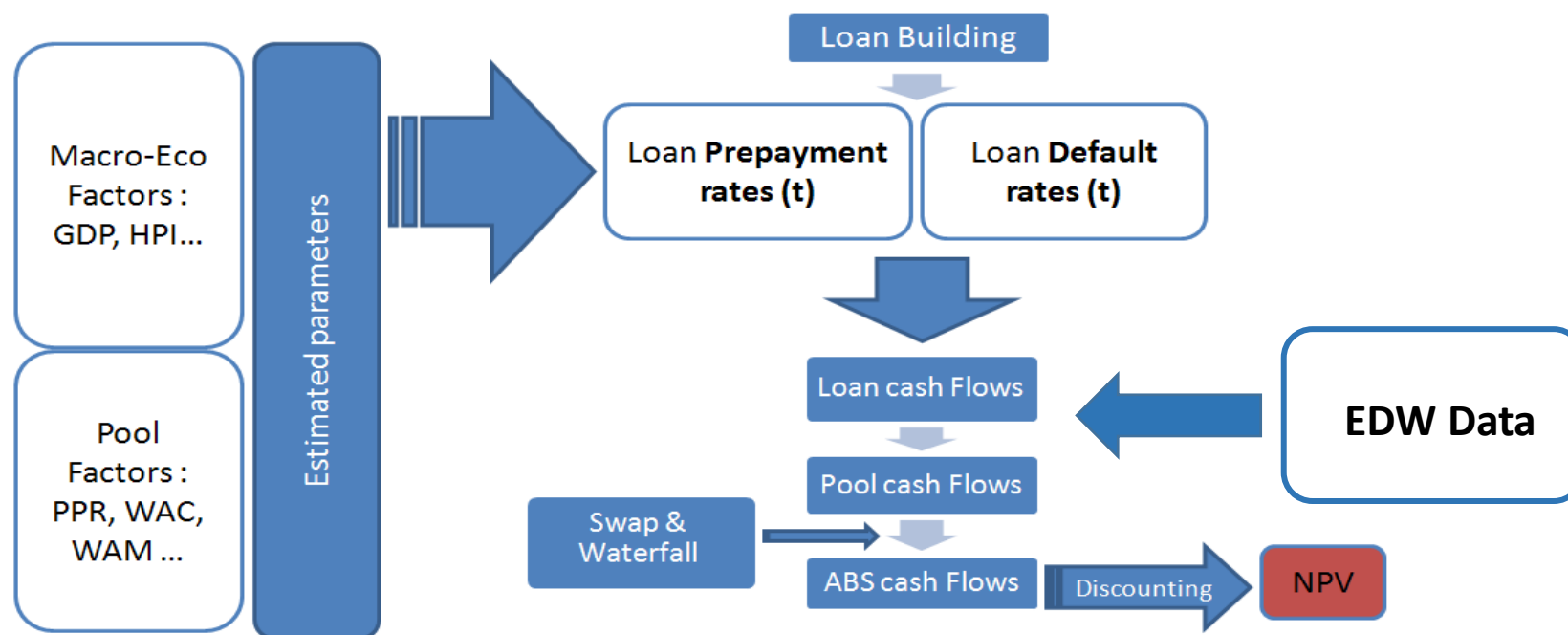


From Eurosystem collateral data (ECB)

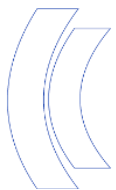
As of Q3 2023, ABS represent 30% of market securities used as collateral, for a total of EUR 364 bn.



VALUATION PARAMETERS AND ESTIMATES

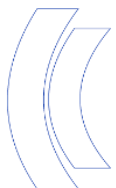


- CEPH uses market data and Credit Agency estimates to predict pricing parameters such as Discount factor, Prepayment rate, and Default rate.
- The Loan Level Data are collected and used for cash flows projections
- We are also using EDW Data on new projects such as the application of Artificial intelligence models for Prepayment rates modelling and the assessment of climate risks by using microloans information



CONTEXT

- The European Union has a target of **climate neutrality** by 2050
- To achieve this objective, different directives have been set out on different sectors such as building and automobile activities
- A trajectory on building **Energy Performance Certificates** (EPC) has been set, including the following measures :
 - All new buildings have to be zero-emission by 2028
 - “Residential buildings need to achieve at least energy performance class E by 2030, and D by 2033”
- For automobile sector, all new cars registered in Europe have to be zero-emission from 2035
- This new European regulation may have a significant impact on the involved sectors. Additionally, it may have an effect on **the perception of ABS by investors through increased transition risk**. We thus investigate whether the market takes into account the EPC of the underlying loans when dealing with ABS.
- Since ABS are accepted as collateral for the ECB monetary policy, this is a key issue for the measure of **risk to the Eurosystem**.
- Specifically, this study measures the effect of EPCs on **ABS (RMBS and AUTOLOANS) liquidation risk and valuation**.
- Please note that this study is a theoretical, exploratory analysis which does not necessarily reflect Eurosystem or Banque de France views.

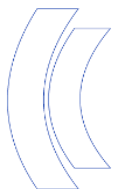


DATA DESCRIPTION

- An ABS is an asset backed by thousands of loans (pool of loans)
- Asset cash flows are directly linked to the characteristics of the underlying loans
- European ABS issuers report loan characteristics through ESMA reporting templates, which are made available online to investors. Since the beginning of 2022, those templates make it possible (but not mandatory) to report the EPC of the purchased property for all loans.
- 58 RMBS active deals in our scope are using the ESMA reporting template and only 32 of them are more or less well-filling the EPC field
- Almost 100% of active Autoloans ABS deals in our scope are using ESMA template and 24 of them are more or less well-filling the EPC field
- For example, a well documented RMBS (BRERA SEC S.R.L.) has the following EPC split:

Pool	Total_All	Total_EPC	EPC_A	EPC_B	EPC_C	EPC_D	EPC_E	EPC_F	EPC_G	EPC_OTHR
BRERA4	61466	48553	4880	2394	3724	5556	5974	7901	18035	89

- For this study, we removed pools where the EPC information is not available for more than 50% of loans
- For the purpose of harmonizing our sample, we keep only assets with weighted average life under five years
- The perimeters are then limited to 24 RMBS and 17 AUTOLOANS ABS

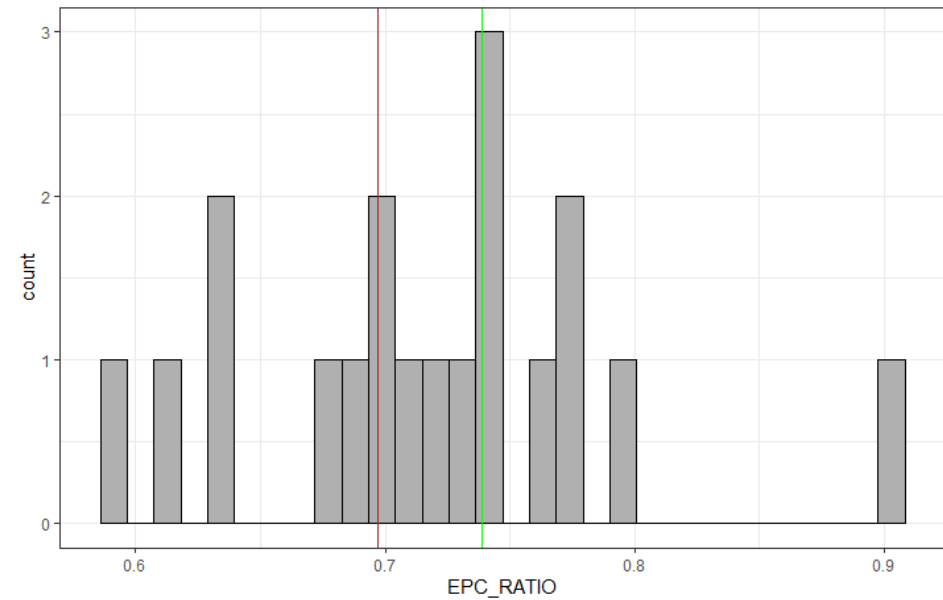
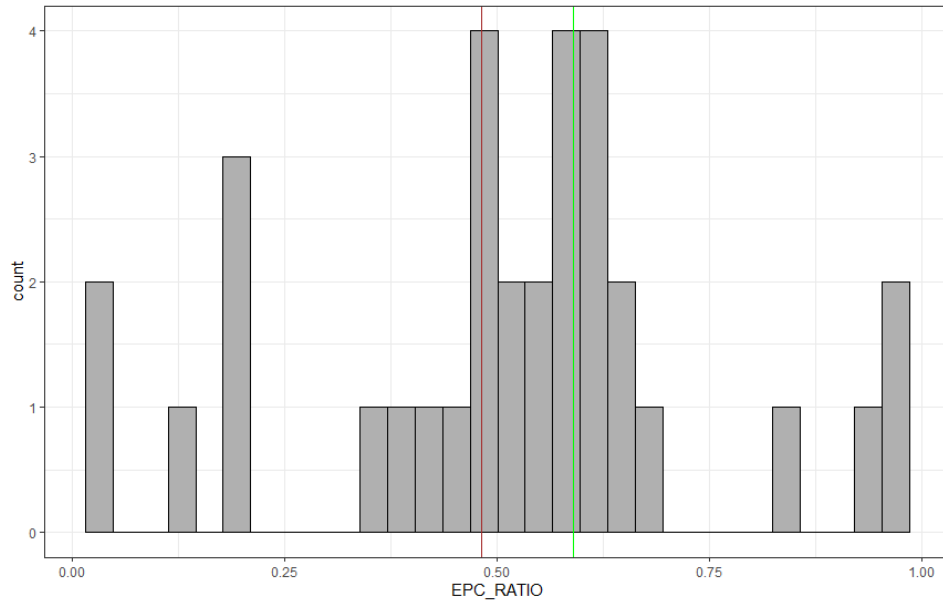


EPC: A PROXY FOR ENERGY EFFICIENCY

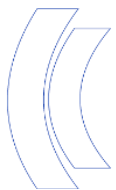
- The EPC classification ranges from class A to class G. The following ratio is set to reflect the energy efficiency of an ABS tranche:

$$EPC_RATIO = \frac{EPC_A + EPC_B + EPC_C}{TOTAL_ALL}$$

- The distribution of that ratio in our dataset is shown in Graph 1



Graph 1 : Distribution of the EPC ratio (left for RMBS and right for Autoloans ABS). “Brown” RMBS are shown on the left of the brown line, while “Green” RMBS are those on the right of the green line

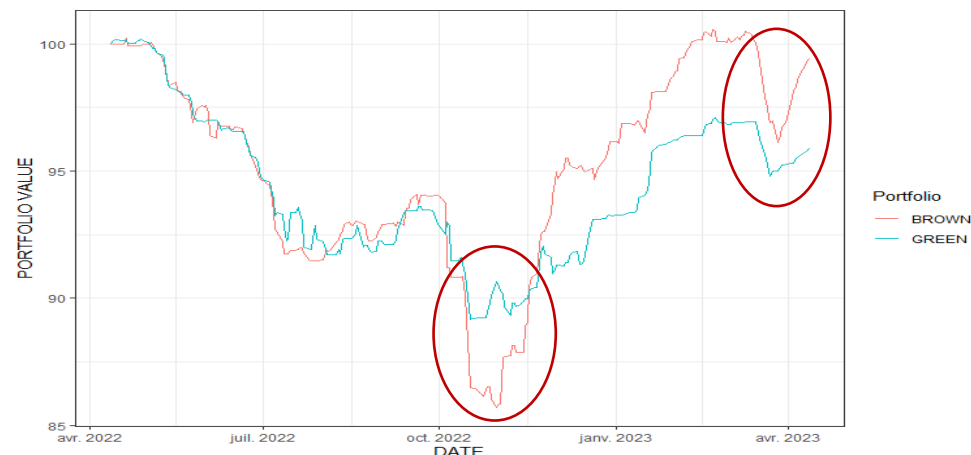


LIQUIDATION RISK : RMBS

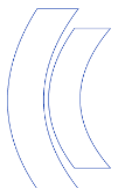
- We compare the performance of the “Green” portfolio with the “Brown” portfolio, which are composed respectively by the “Green” ABS and “Brown” ABS
- We computed the daily returns of each portfolio and the average time required to liquidate the positions between 4/12/2022 and 4/12/2023
- We found the interesting below results:

	ES_5% weekly	Average Liquidation time (weeks)	Final liquidation risk
BROWN	-2,61%	16	-10,44%
GREEN	-1,88%	17	-7,75%

Table 1 : “Green” portfolio vs “Brown” portfolio Expected Shortfall (ES) and liquidity risk



- Table 1 shows that the volatility of the “Green” portfolio is lower compared to the “Brown” portfolio
- The “Green” Portfolio appears to be less affected when conditions are adverse on the RMBS market (Graph 2)

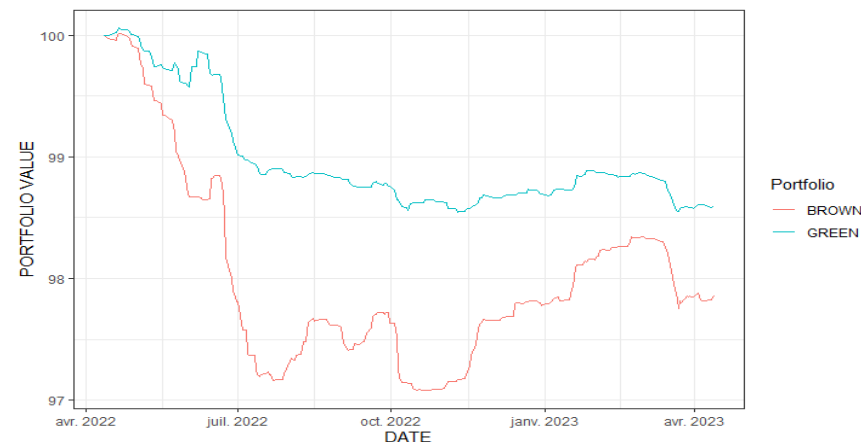


LIQUIDATION RISK : AUTOLOANS

- As for RMBS, we use the same methodology and analysis period for AUTOLOANS ABS
- We found the interesting below results for the AUTOLOANS ABS:

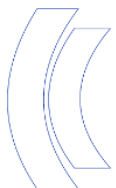
	ES_5% weekly	Average Liquidation time (weeks)	Final liquidation risk
BROWN	-0,42%	2,3	-0,64%
GREEN	-0,21%	1,6	-0,27%

Table 2 : “Green” portfolio vs “Brown” portfolio Expected Shortfall (ES) and liquidity risk



Graph 3 : “Green” portfolio vs “Brown” portfolio performance. Value = 100 at 04/12/2022

- Table 2 shows that the volatility of the “Green” portfolio is lower compared to the “Brown” portfolio
- The difference is smaller compared to the RMBS result
- The “Green” Autoloans Portfolio appears to have better performance compared to the “Brown” Autoloans Portfolio when conditions are adverse (Graph 3)



VALUATION: AN ENERGY PERFORMANCE PREMIUM ?

- For each ABS, we calculate an implied discount margin (IDM), which is the discount rate (risk free rate + IDM) at which the observed market price is equal to the NPV of cash flows.
- We estimate the effect of Energy performance (measured by EPC) on IDM using the following linear regression model:

$$IDM = \alpha_1 WAL + \alpha_2 Spread + \alpha_3 EPC_RATIO + \alpha_4 Issued_amount + \alpha_5 income + \beta_c$$

- The result below shows that a higher EPC RATIO for an RMBS implies a lower IDM

Variables	Coefficients	Significance
WAL	8,7	***
Sprerad	-0,28	.
β_FR	46	``
β_NL	-16	``
EPC_RATIO	-86	***
Issued Amount	-2,70E-08	*
income	2,00E-03	***

Variables	Coefficients	Significance
WAL	-4,8	***
Sprerad	-0,39	***
β_DE	54	***
β_FR	82	***
EPC_RATIO	6,9	``
Issued Amount	-1,80E-08	***
income	8,30E-08	``

Table 3: IDM regression results. The left table for RMBS and the right table for AUTOLOANS ABS

*** ($p_value < 0,001$), ** ($p_value < 0,01$), * ($p_value < 0,05$), . ($p_value < 0,1$), `` ($p_value > 0,1$)

- All else being equal, it appears that the market is asking a higher yield for “Brown” RMBS
- We do not find a premium in the case of AUTOLOANS ABS



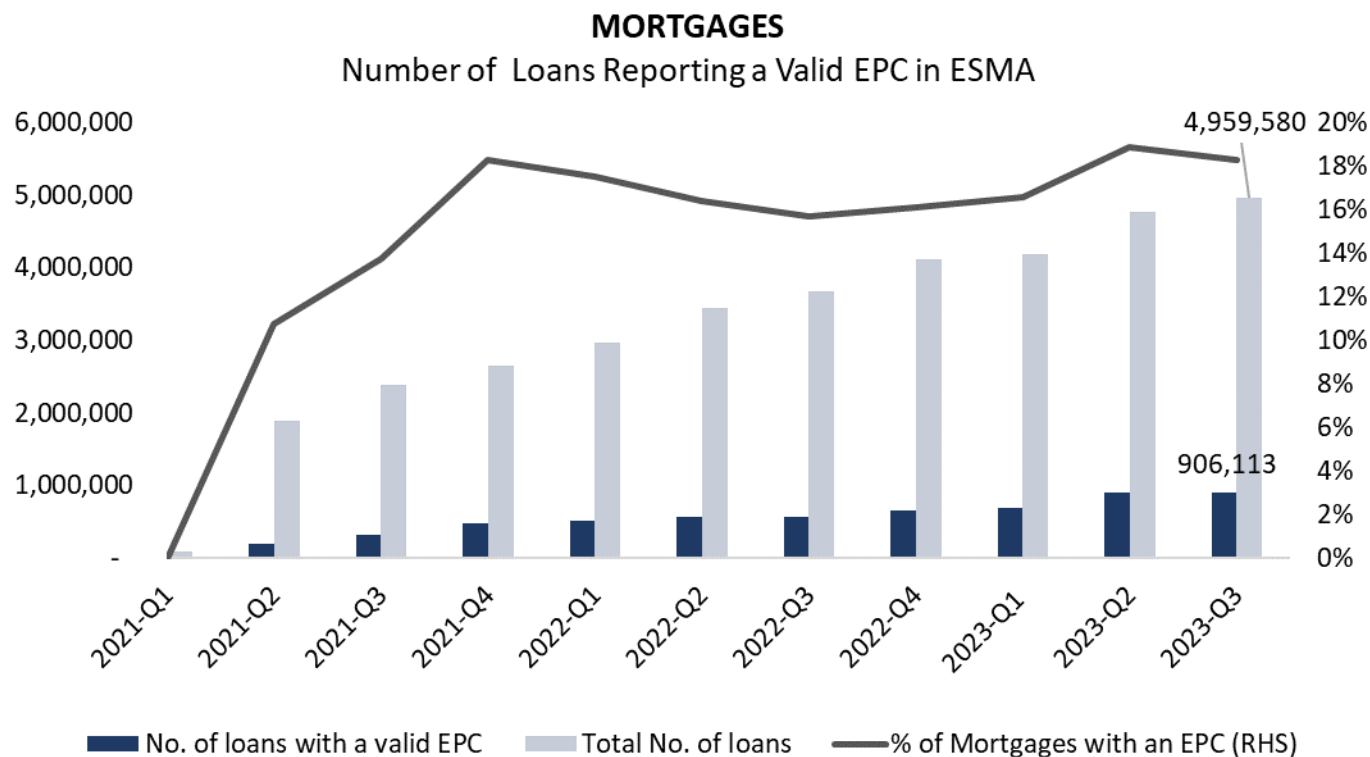
CONCLUSION

- This preliminary investigation on the effect of climate risk on ABS market shows that:
 - The “Green” deals tend to have smaller volatility compared to the “Brown” deals
 - The “Green” RMBS deals premium appears to be lower than the “Brown” RMBS deals premium
- One explanation for these results could be the disparity between the demand and the supply of the “Green” deals
- Due to the lack of data availability and the recent introduction of the EPC in the ESMA template, this study will be repeated in the near future in order to have larger datasets
- Some bias on the assets (option, swap, rates.. Effect) or on the pools (waterfall, revolving effect) may subsist. We are working on neutralizing them

EPC DISCLOSURE IN EUROPEAN MORTGAGE LOANS

EPC DATA AVAILABILITY

Residential Mortgages

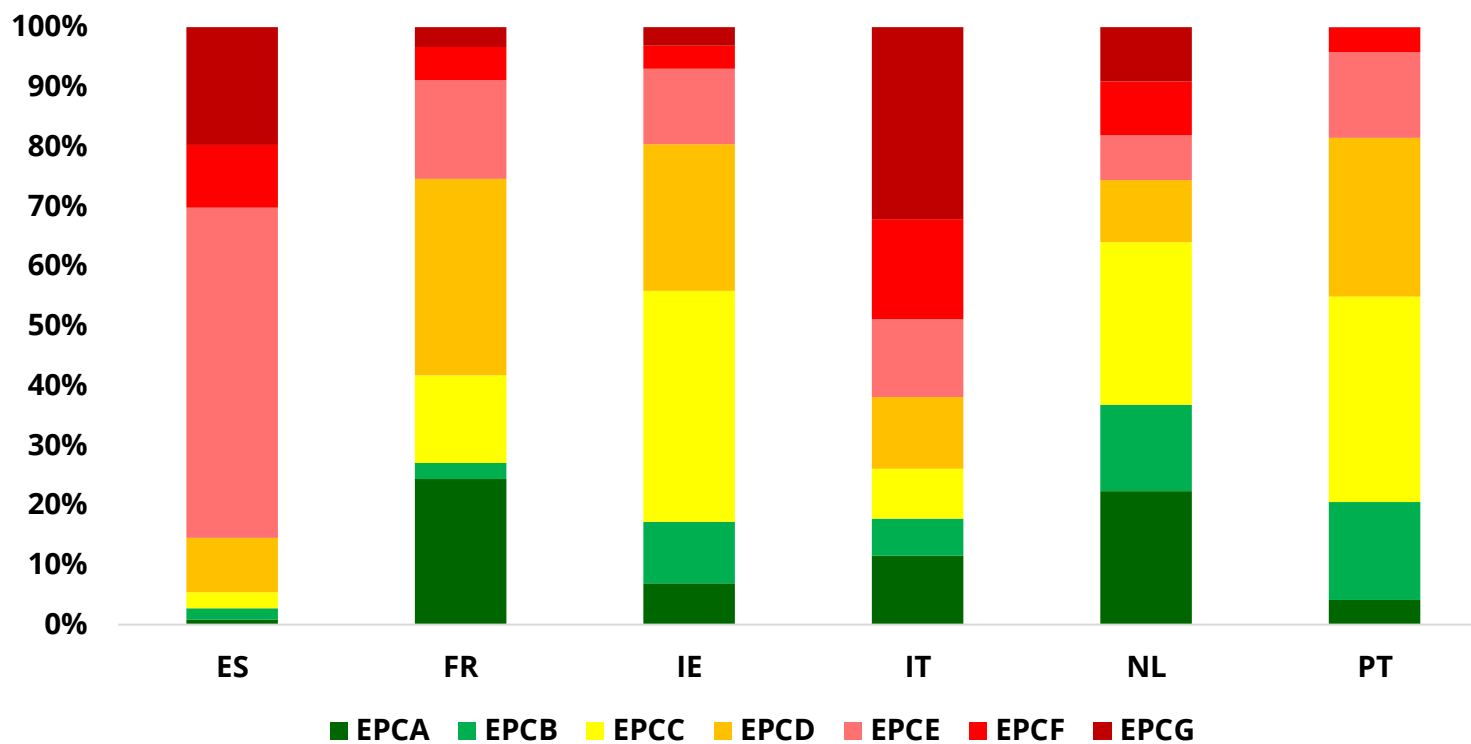


Source: European DataWarehouse

EPC DISTRIBUTION IN EDW DATA

Residential Mortgages

EPC distribution by Country using EDW data
(based on number of loans)

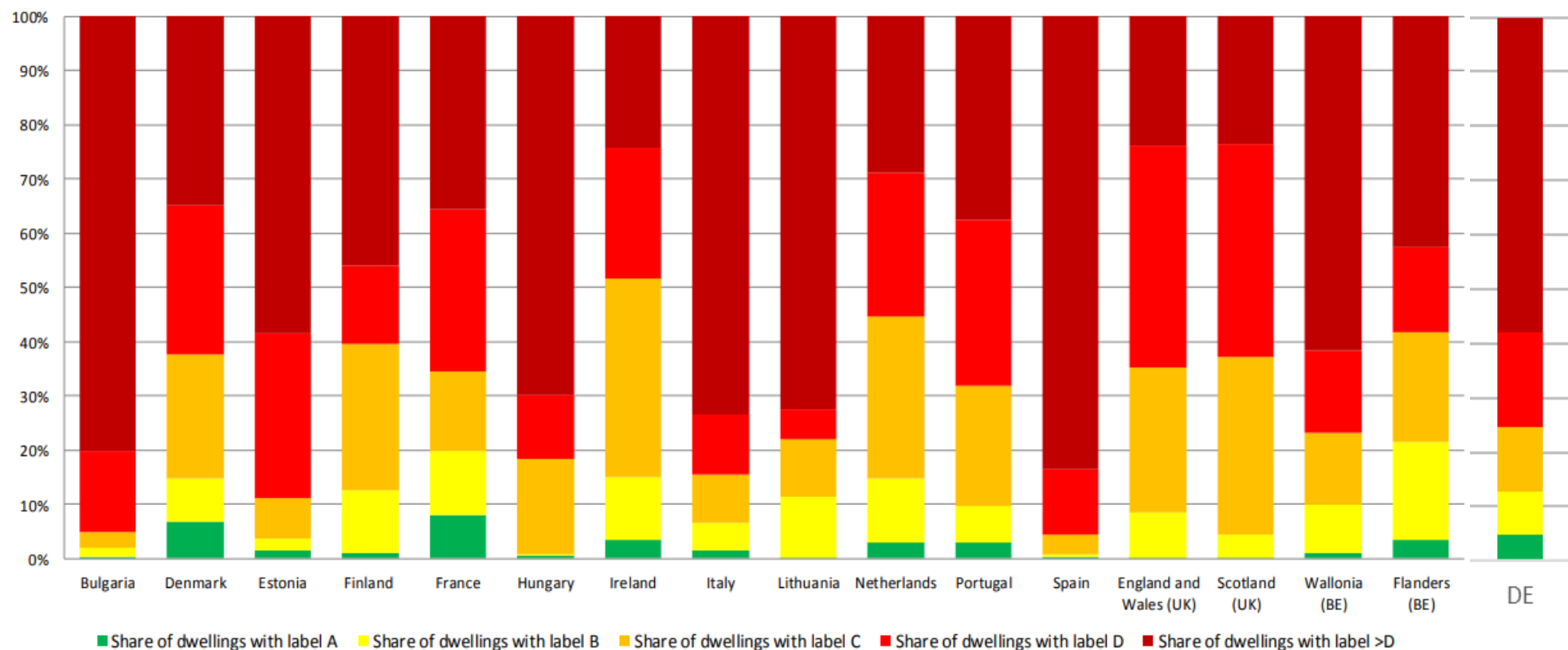


Source: European DataWarehouse

EPC DISTRIBUTION FROM PUBLIC SOURCES

Residential Buildings

Distribution of the building stock in the EU per EPC class



Source: Buildings Performance Institute Europe (2017), Factsheet: 97% of buildings need to be upgraded; Statista (2021)

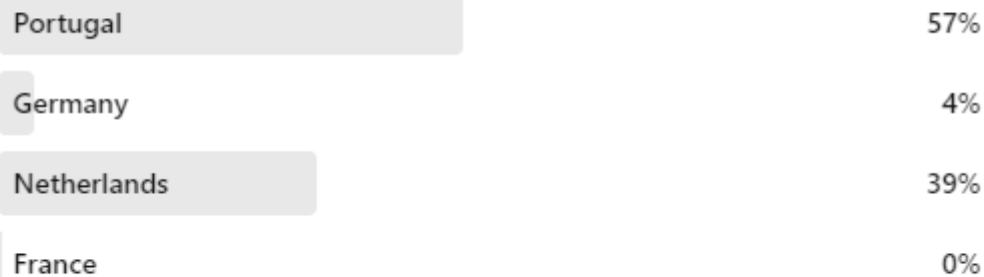
Link: https://www.bpie.eu/wp-content/uploads/2017/12/State-of-the-building-stock-briefing_Dic6.pdf

LINKEDIN POLL

Most participants voted that houses in Portugal consume the least energy!

Which country has the lowest average yearly energy consumption in kWh/m2 for Mortgaged Residential Properties?

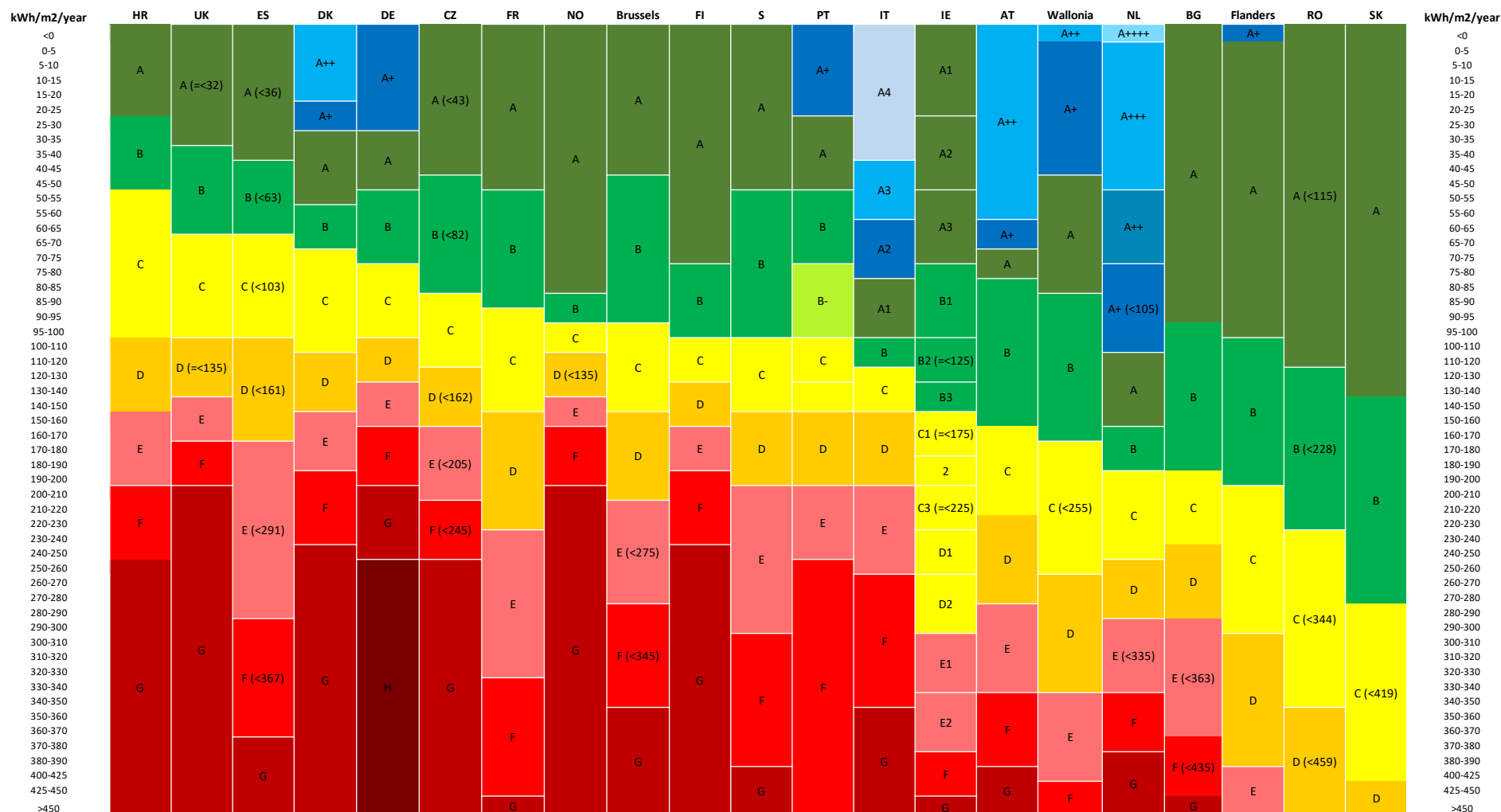
You can see how people vote. [Learn more](#)



[23 votes](#) • 6d left • [Hide results](#)

EPC THRESHOLDS BY COUNTRY

Residential Buildings



Sources: BPiE, ING, national and EU sources;

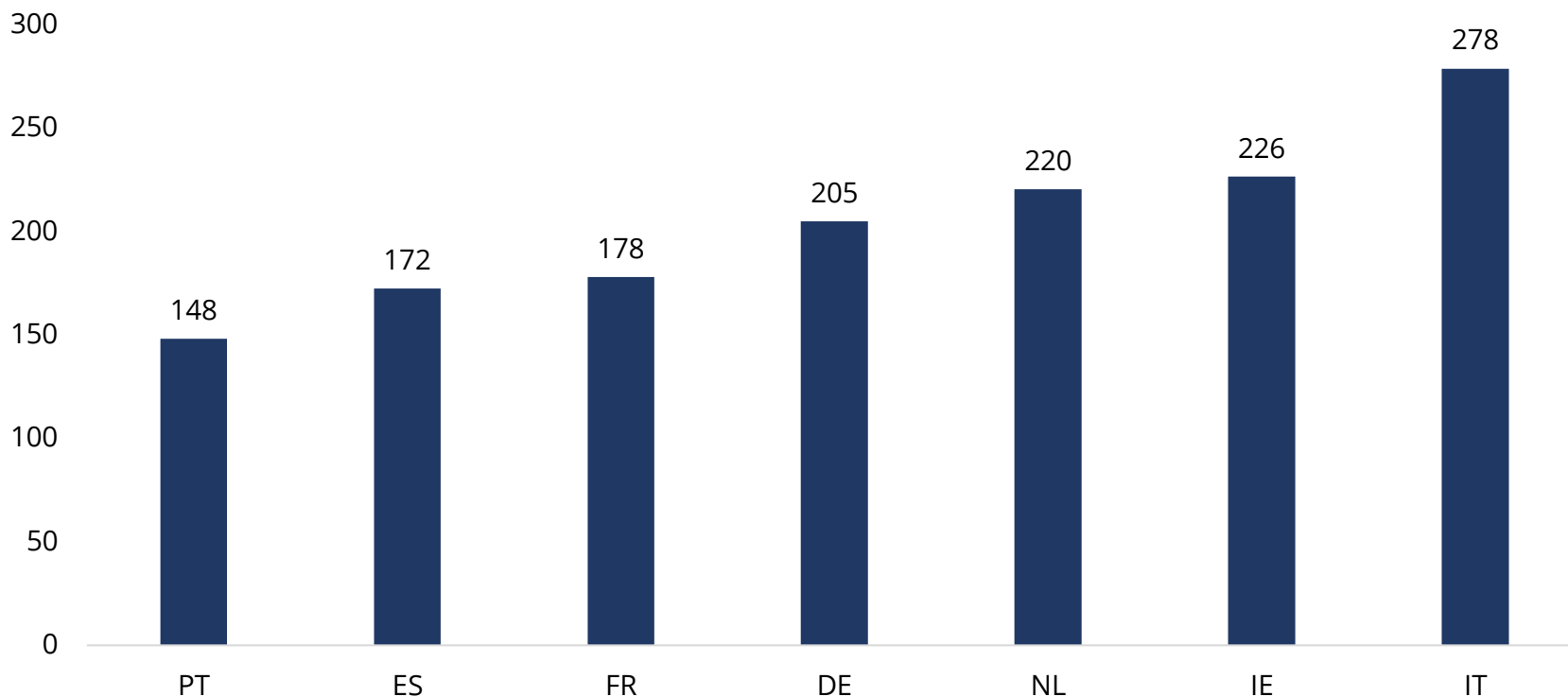
Final energy for DE, CZ, RO, NO, UK; Primary Energy for FR, DK, FI, AU, NL, PT, IE, BE, S, IT

DECEMBER 2023

ESTIMATED AVERAGE PRIMARY ENERGY CONSUMPTION PER COUNTRY

Residential Buildings

ESTIMATED AVERAGE ENERGY EFFICIENCY OF RESIDENTIAL PROPERTIES (KWH/M2/YEAR)

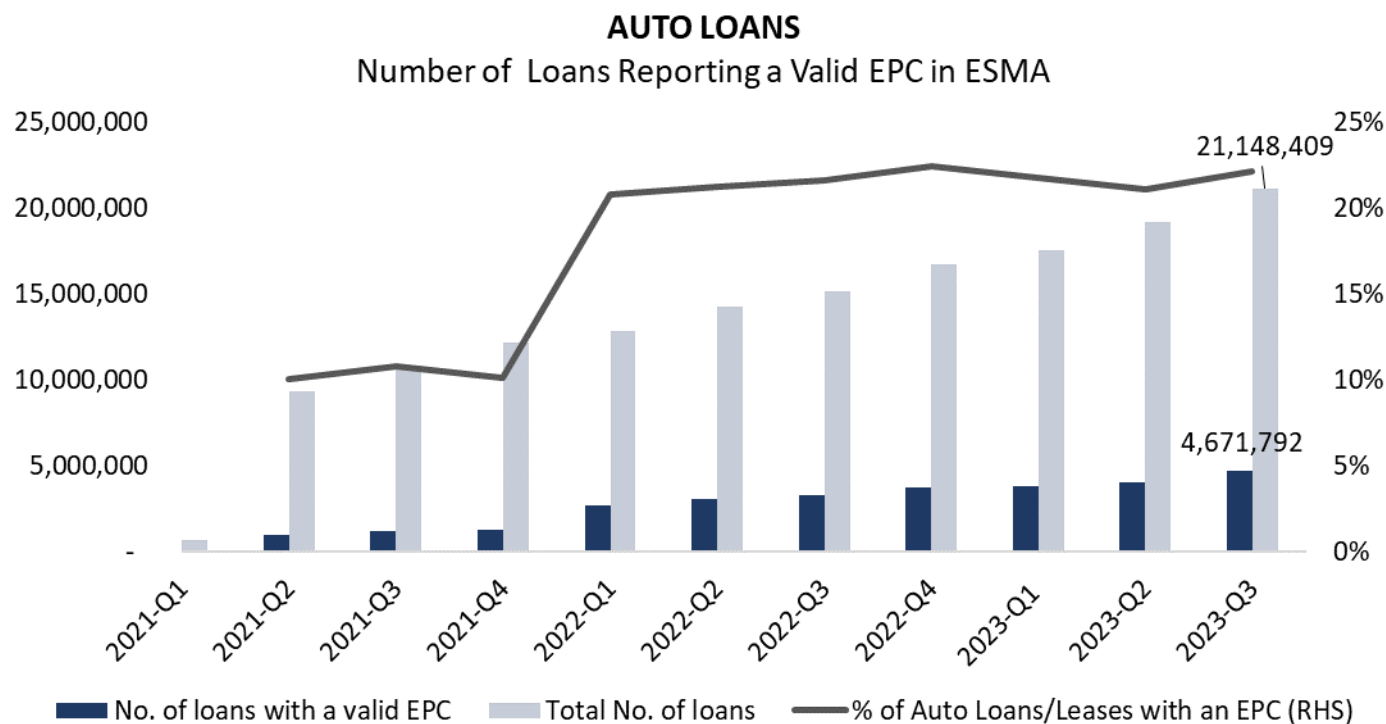


Source: European DataWarehouse

EPC DISCLOSURE IN EUROPEAN AUTO LOANS

EPC DATA AVAILABILITY

Auto loans

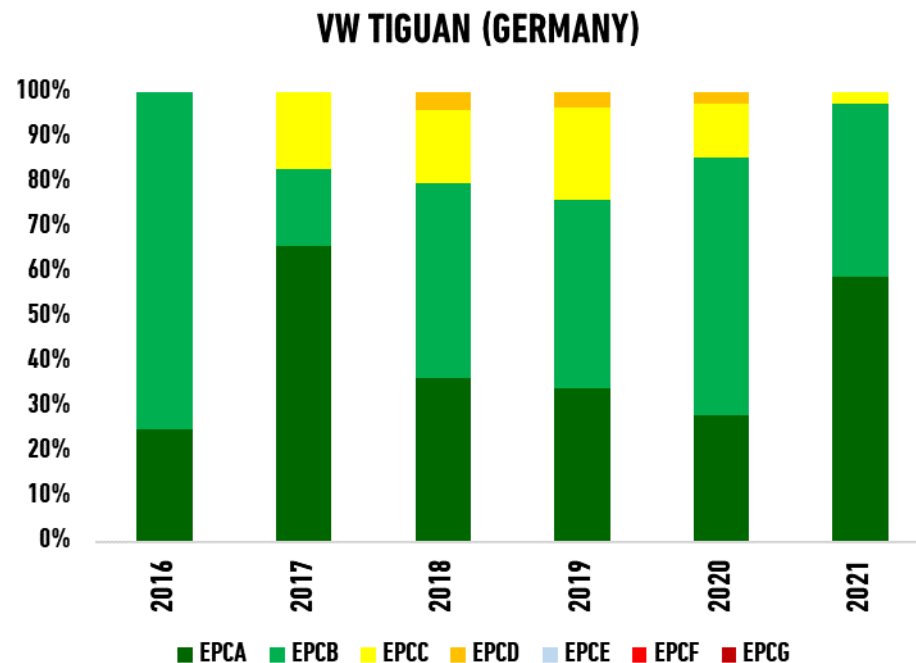
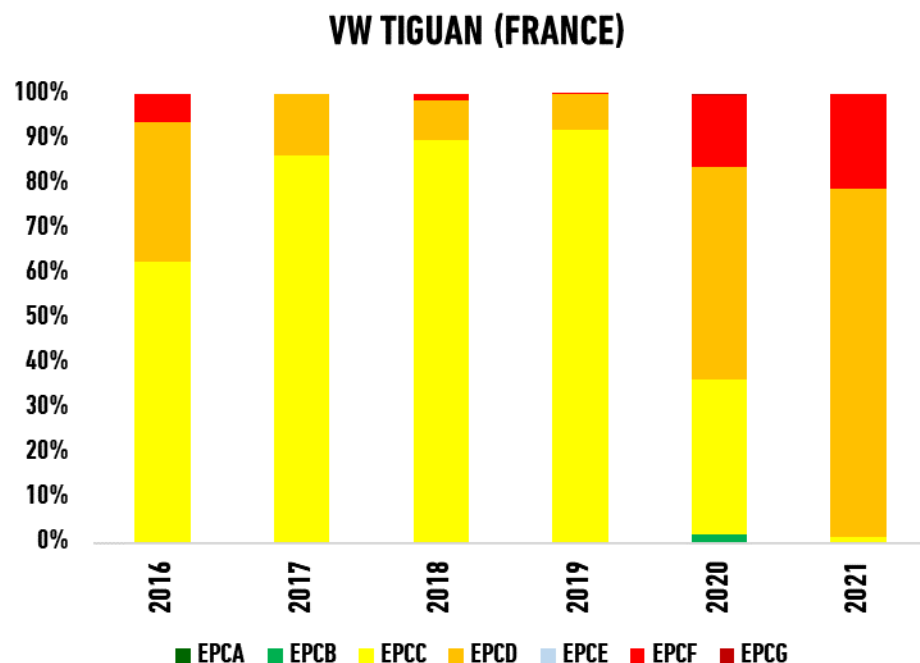


Source: European DataWarehouse

ENERGY PERFORMANCE CERTIFICATES – AUTO LOANS

Different EPCs for the same car models in different countries

EPC DISTRIBUTION OF NEW CARS GROUPED BY YEAR OF LOAN ORIGINATION

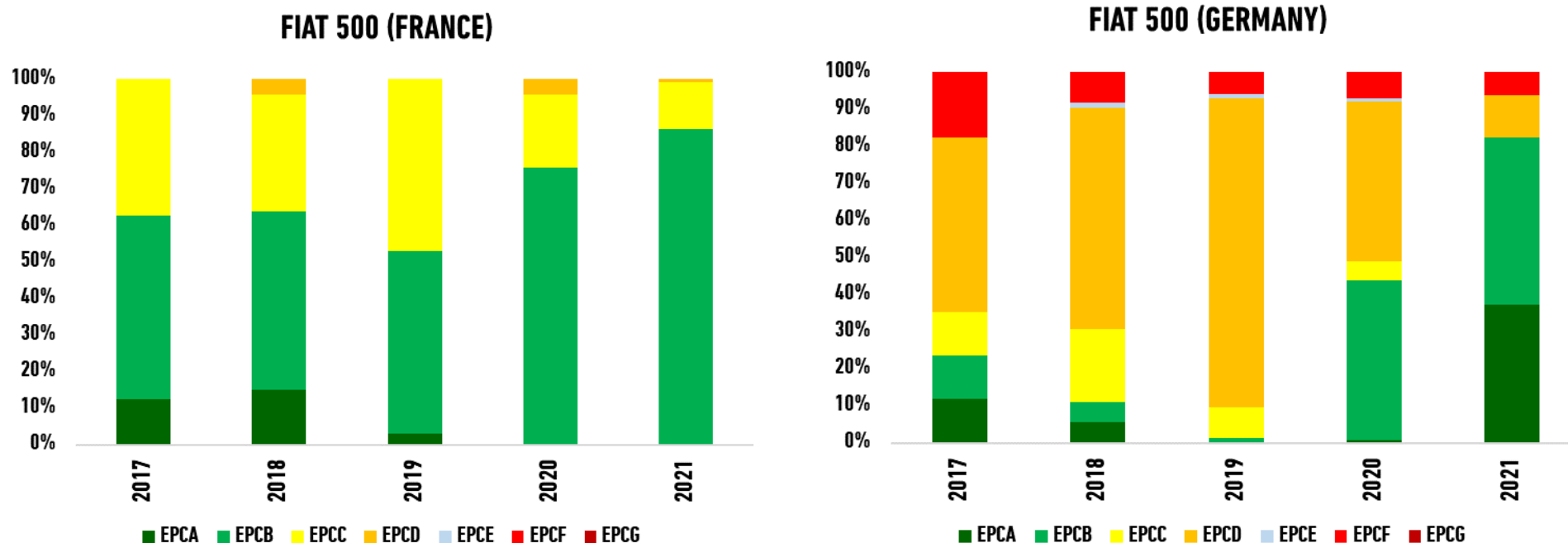


Source: European DataWarehouse

ENERGY PERFORMANCE CERTIFICATES – AUTO LOANS

Different EPCs for the same car models in different countries

EPC DISTRIBUTION OF NEW CARS GROUPED BY YEAR OF LOAN ORIGINATION

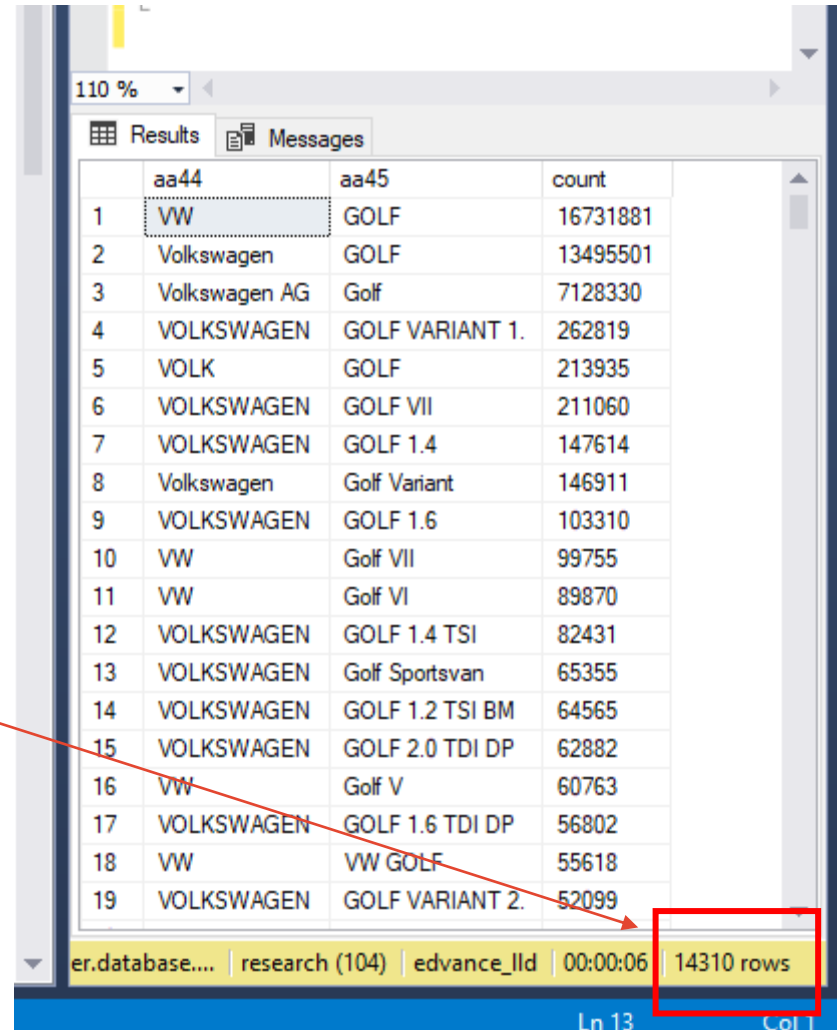


Source: European DataWarehouse

EDW DATA - MINING CAR MODEL DATA TO IMPLY FUEL TYPE

Car Manufacturer and Model is reported to EDW for each Auto loan/lease

- Need to standardise these 3 characteristics:
 - Manufacturer
 - Model
 - Imply Fuel Type (not Available in the templates)
- A large text mining exercise:
 - **14,310** unique combinations for Volkswagen Golf alone!!
- Hints for implying fuel type, example:
 - TDI implies Diesel
 - TSI implies Petrol and so on

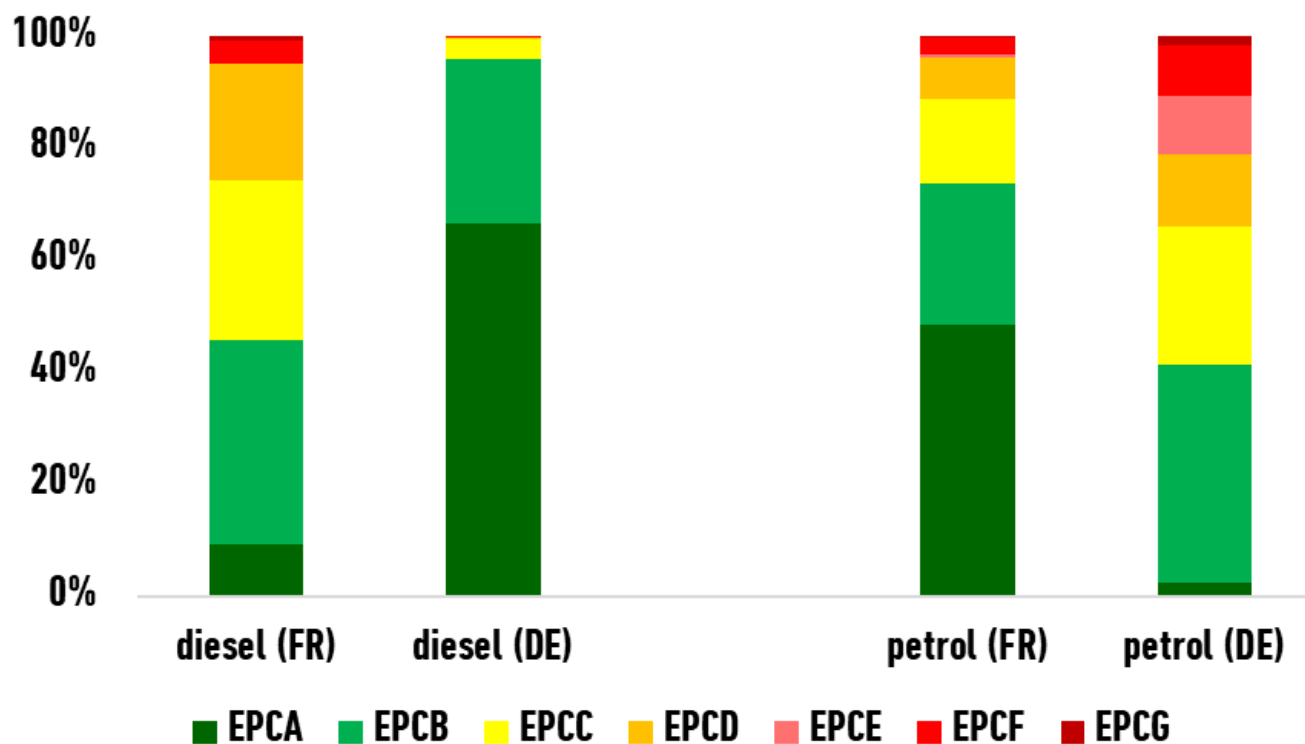


	aa44	aa45	count
1	VW	GOLF	16731881
2	Volkswagen	GOLF	13495501
3	Volkswagen AG	Golf	7128330
4	VOLKSWAGEN	GOLF VARIANT 1.	262819
5	VOLK	GOLF	213935
6	VOLKSWAGEN	GOLF VII	211060
7	VOLKSWAGEN	GOLF 1.4	147614
8	Volkswagen	Golf Variant	146911
9	VOLKSWAGEN	GOLF 1.6	103310
10	VW	Golf VII	99755
11	VW	Golf VI	89870
12	VOLKSWAGEN	GOLF 1.4 TSI	82431
13	VOLKSWAGEN	Golf Sportsvan	65355
14	VOLKSWAGEN	GOLF 1.2 TSI BM	64565
15	VOLKSWAGEN	GOLF 2.0 TDI DP	62882
16	VW	Golf V	60763
17	VOLKSWAGEN	GOLF 1.6 TDI DP	56802
18	VW	VW GOLF	55618
19	VOLKSWAGEN	GOLF VARIANT 2.	52099

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EPCS ASSIGNED TO CARS BY ENGINE TYPE – GERMANY VS FRANCE

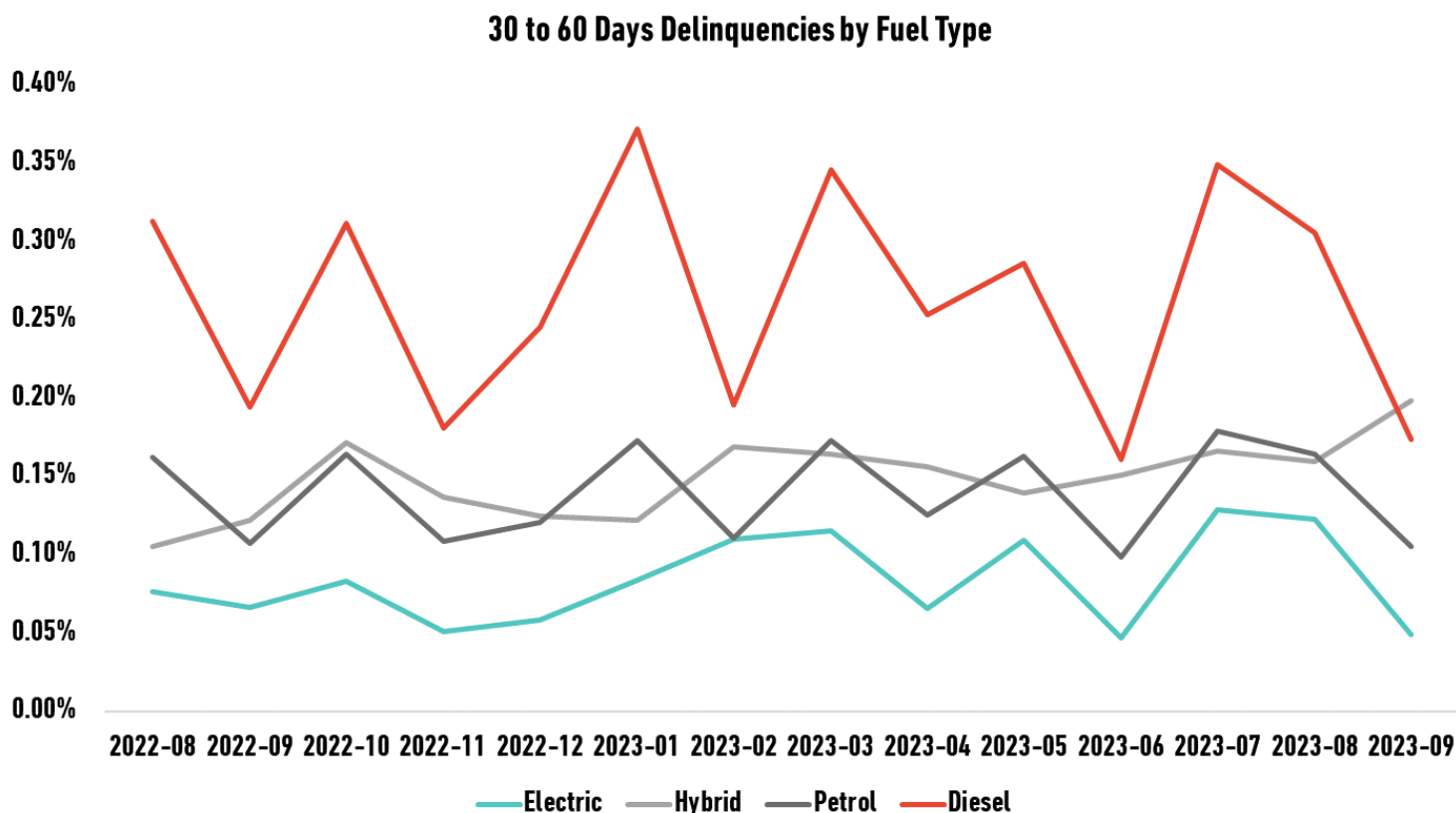
- Diesel cars have better EPCs in Germany
- Petrol cars have better EPCs in France



Source: European DataWarehouse

GERMAN AUTO ABS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

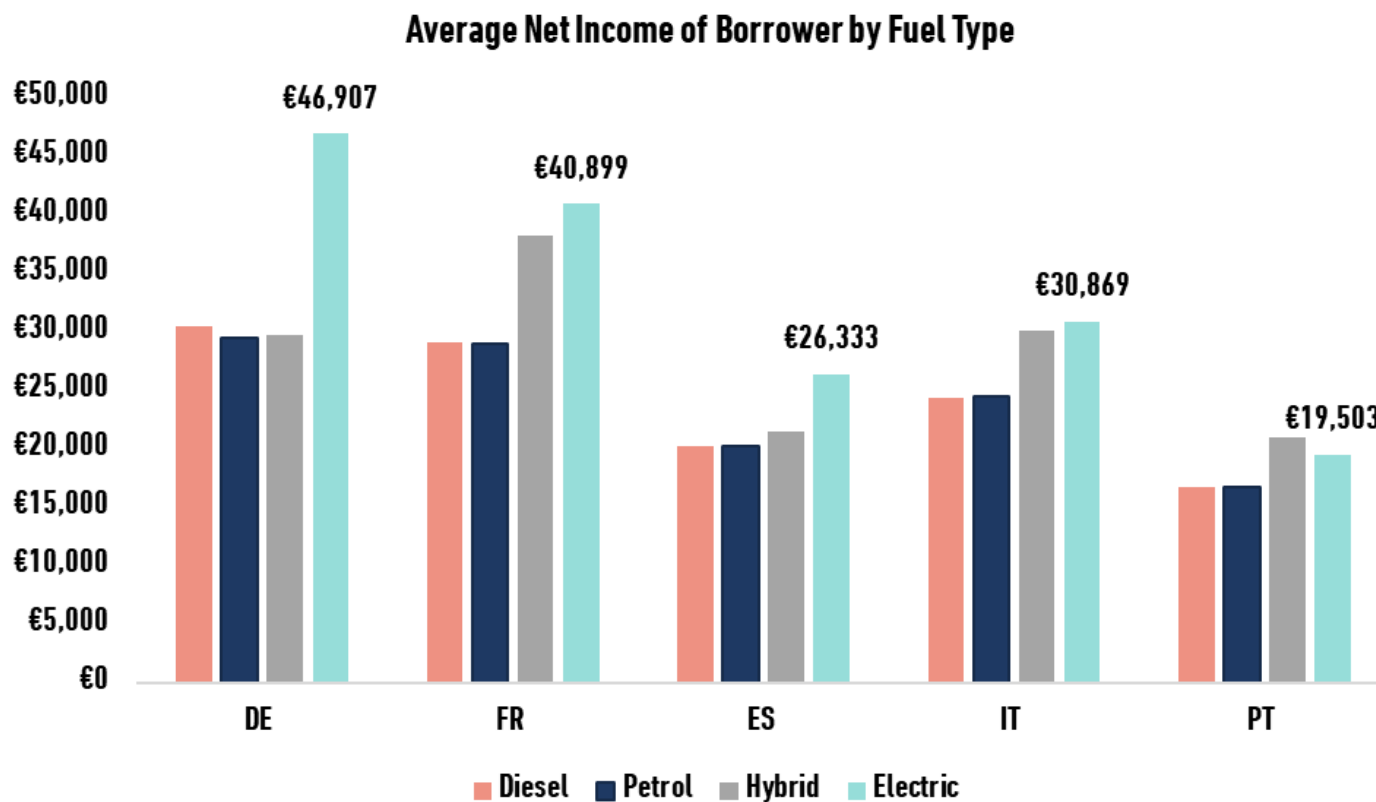
Electric cars seem to have the lowest delinquency levels when compared with cars of other fuel types



Source: European DataWarehouse

AUTO ABS – BORROWER INCOME BY FUEL TYPE

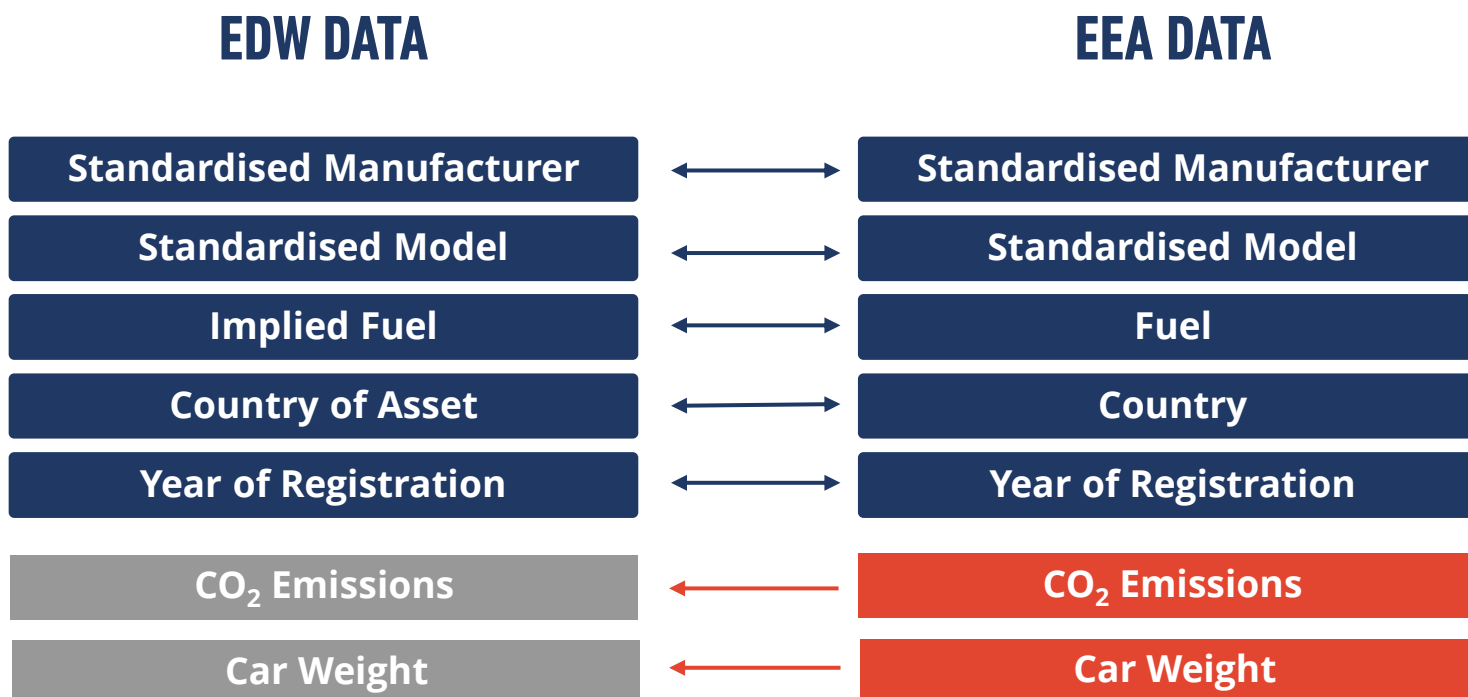
Borrowers that get a loan/lease for electric cars have the highest incomes



Source: European DataWarehouse

ESTIMATING CO₂ EMISSIONS FOR CAR LOANS/LEASES IN EDW DATA

Matching EDW data with European Environment Agency (EEA) data

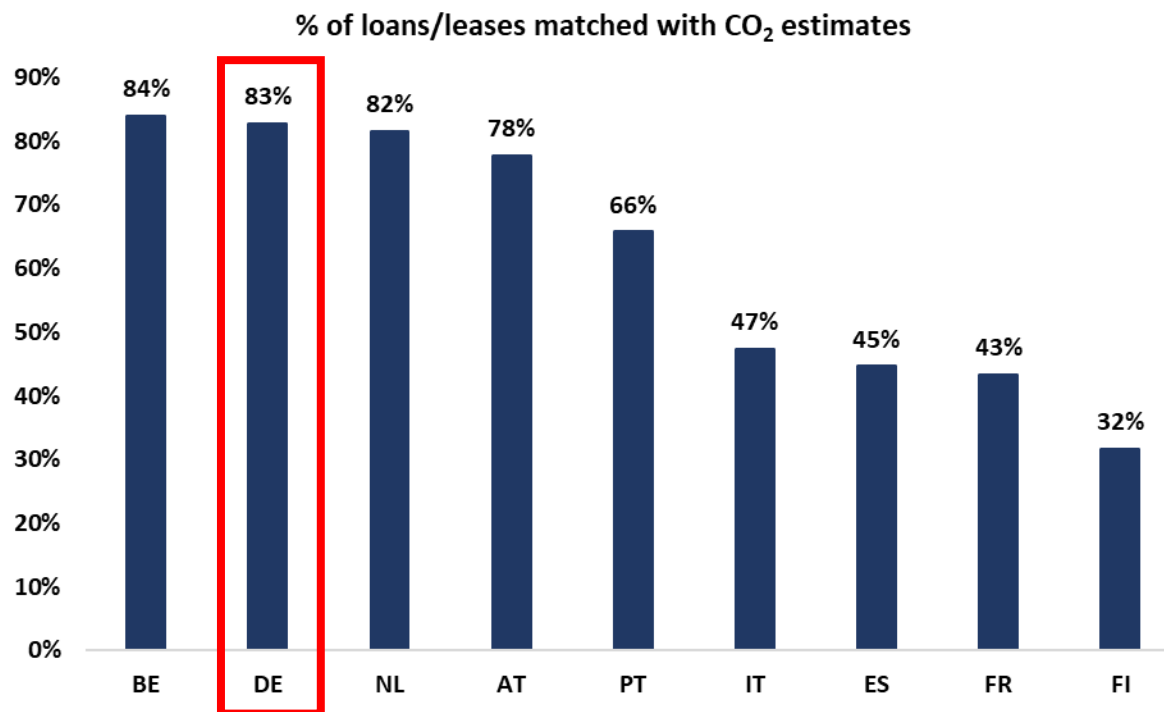


Assumptions

- If fuel cannot be implied using available info, the average CO₂ emissions of Petrol + Diesel cars for the manufacturer, model, year, and country are used
- For cases where only NEDC standard emissions are available, a factor of 1.2 is used to convert NEDC emissions to estimated WLTP emissions

CO2 EMISSIONS MATCHING

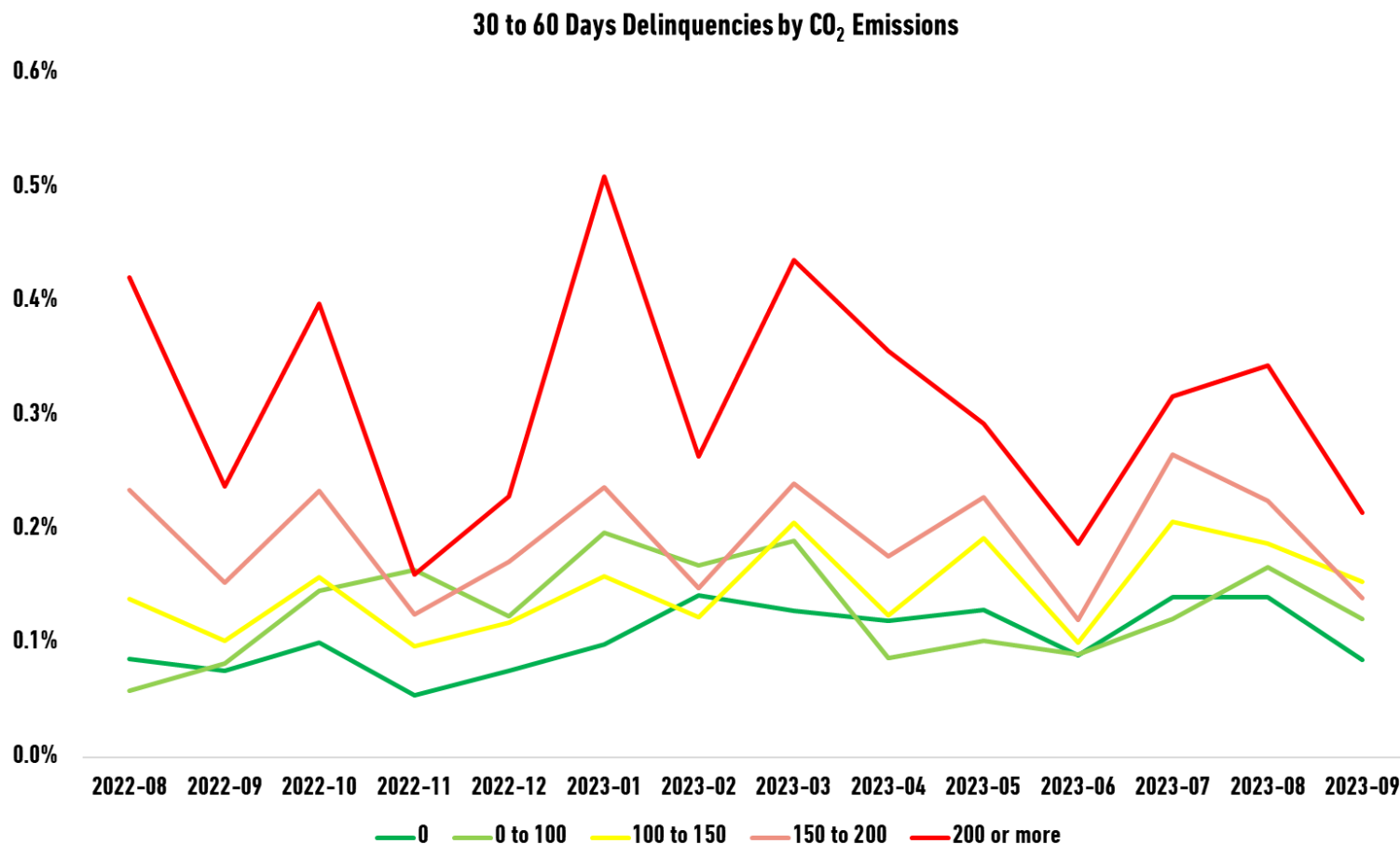
83% of German Auto loans/leases were matched with a CO₂ Emissions estimate



Source: European DataWarehouse

GERMAN AUTO ABS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

Low emission vehicles seem to have lower delinquency levels

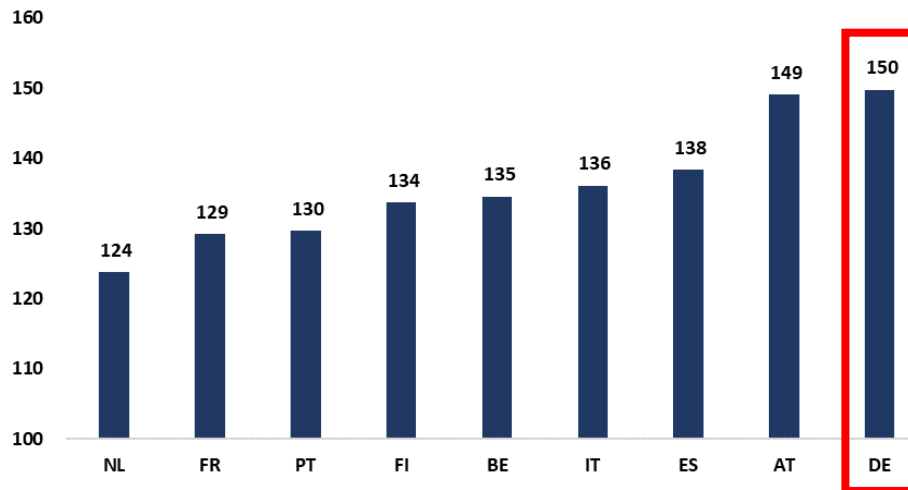


Source: European DataWarehouse

CO₂ EMISSIONS ESTIMATES

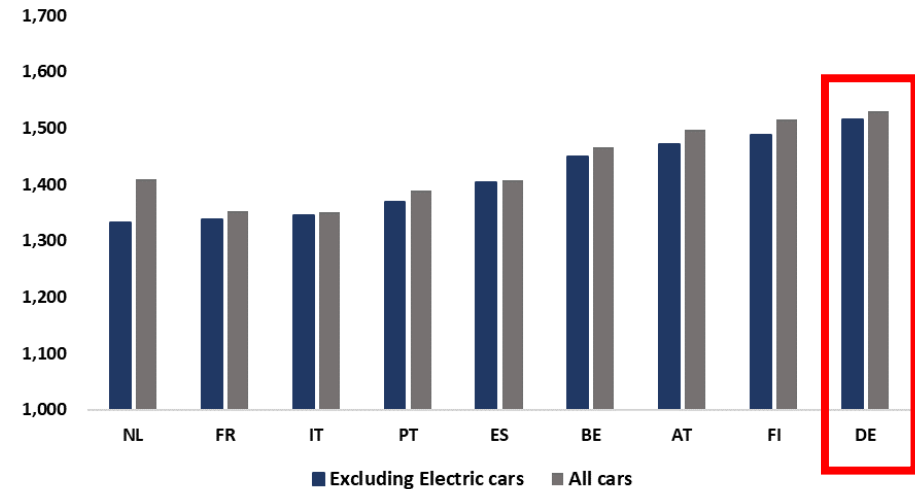
Germany has highest estimated average CO₂ emissions for cars in ABS portfolios

Avg CO₂ Emissions (g/km) for all ABS deals by Country
(WLTP Standard weighted by Balance of loans)



Source: European DataWarehouse

Avg car weight (kg) for New cars registered since 2016



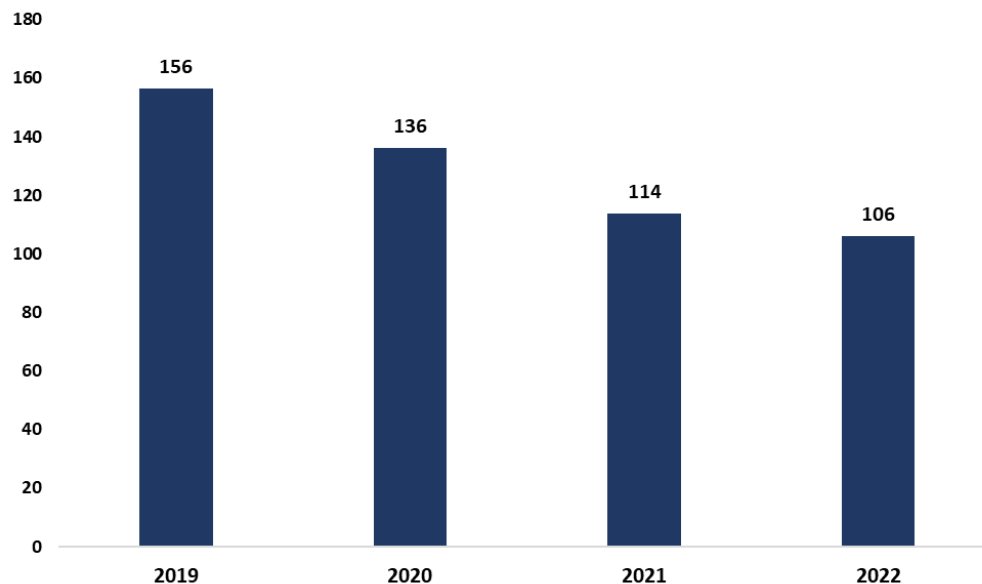
Source: European Environment Agency

- German consumers appear to have a preference for heavier cars

CO₂ EMISSION TRENDS

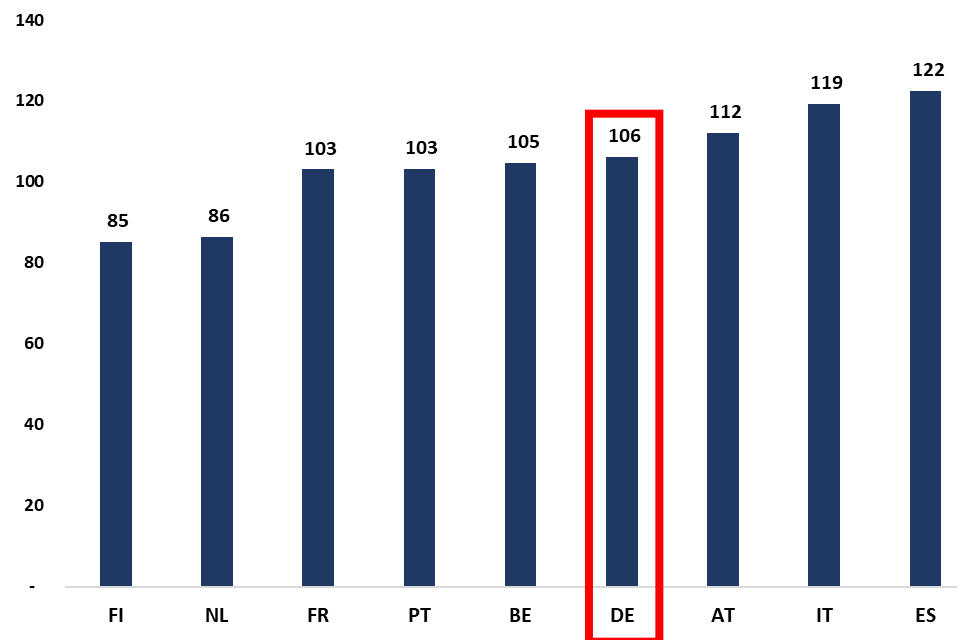
German consumers are buying more low emission vehicles every year

Avg CO₂ emissions (g/km) of New Passenger Cars in Germany has fallen each year



Source: European Environment Agency

Avg CO₂ emissions (g/km) of New Passenger Cars in 2022

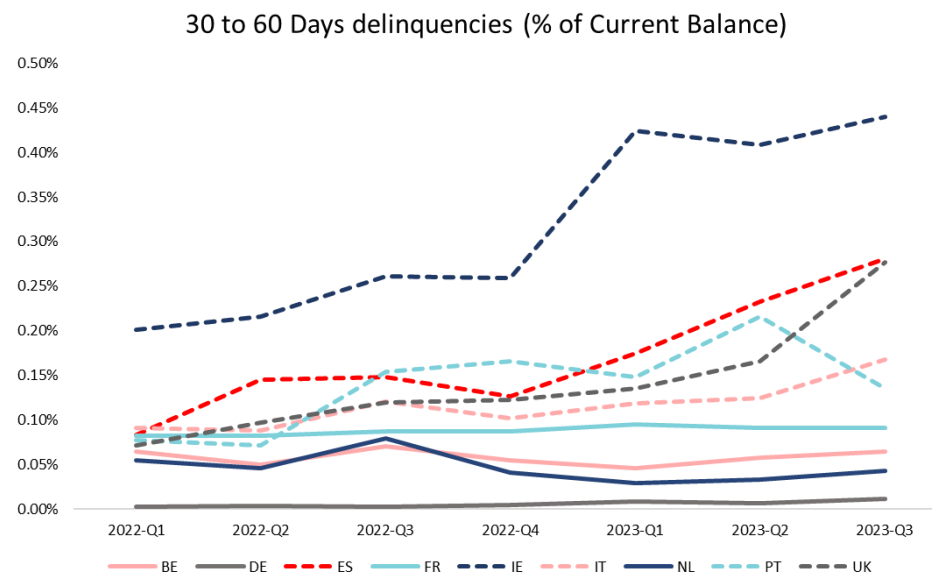
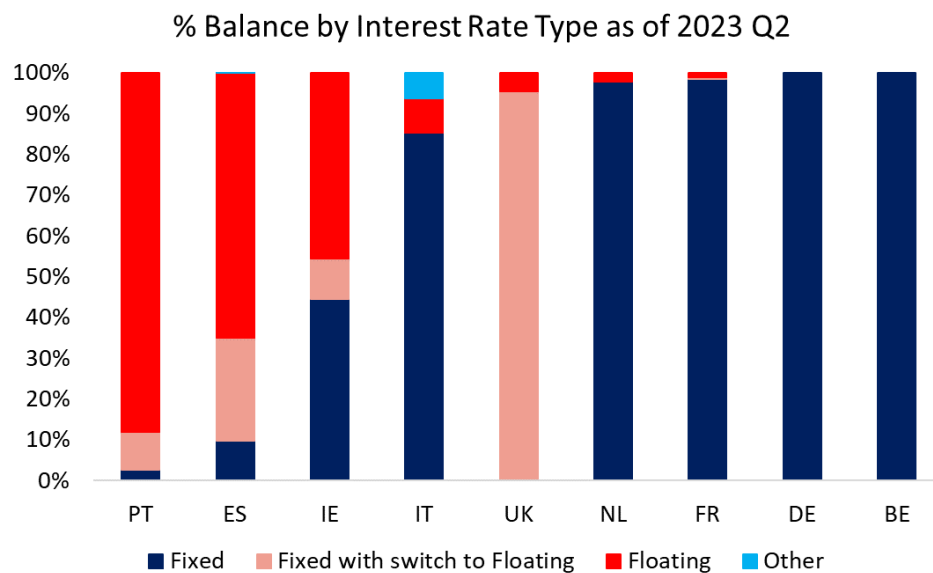


Source: European Environment Agency

RMBS LOANS PERFORMANCE UPDATE

RMBS

Are Floating Rate Mortgages driving delinquencies??



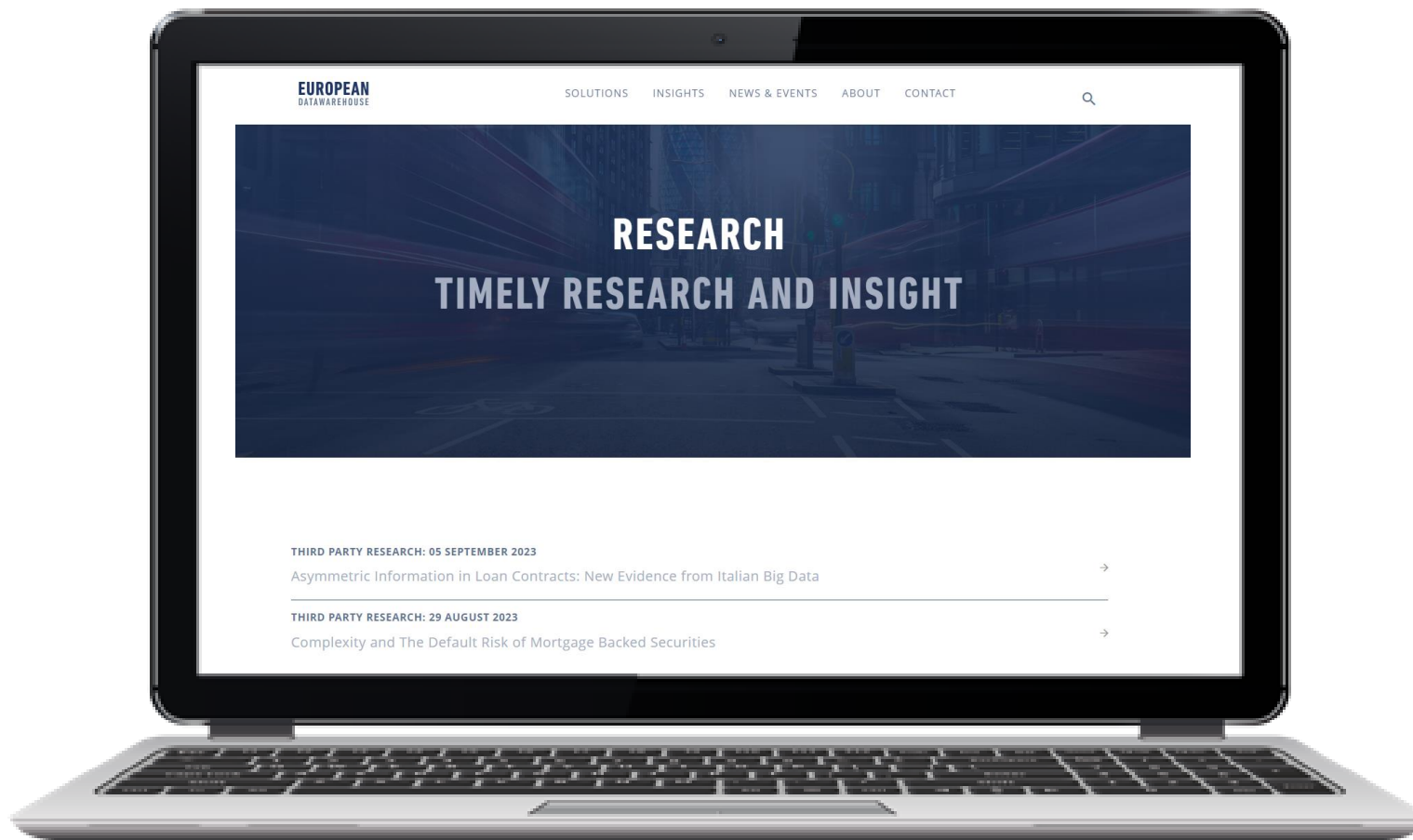
Source: European DataWarehouse

USING EDW DATA FOR ACADEMIC RESEARCH

CONSULT EXISTING PUBLICATIONS

RESEARCH SECTION

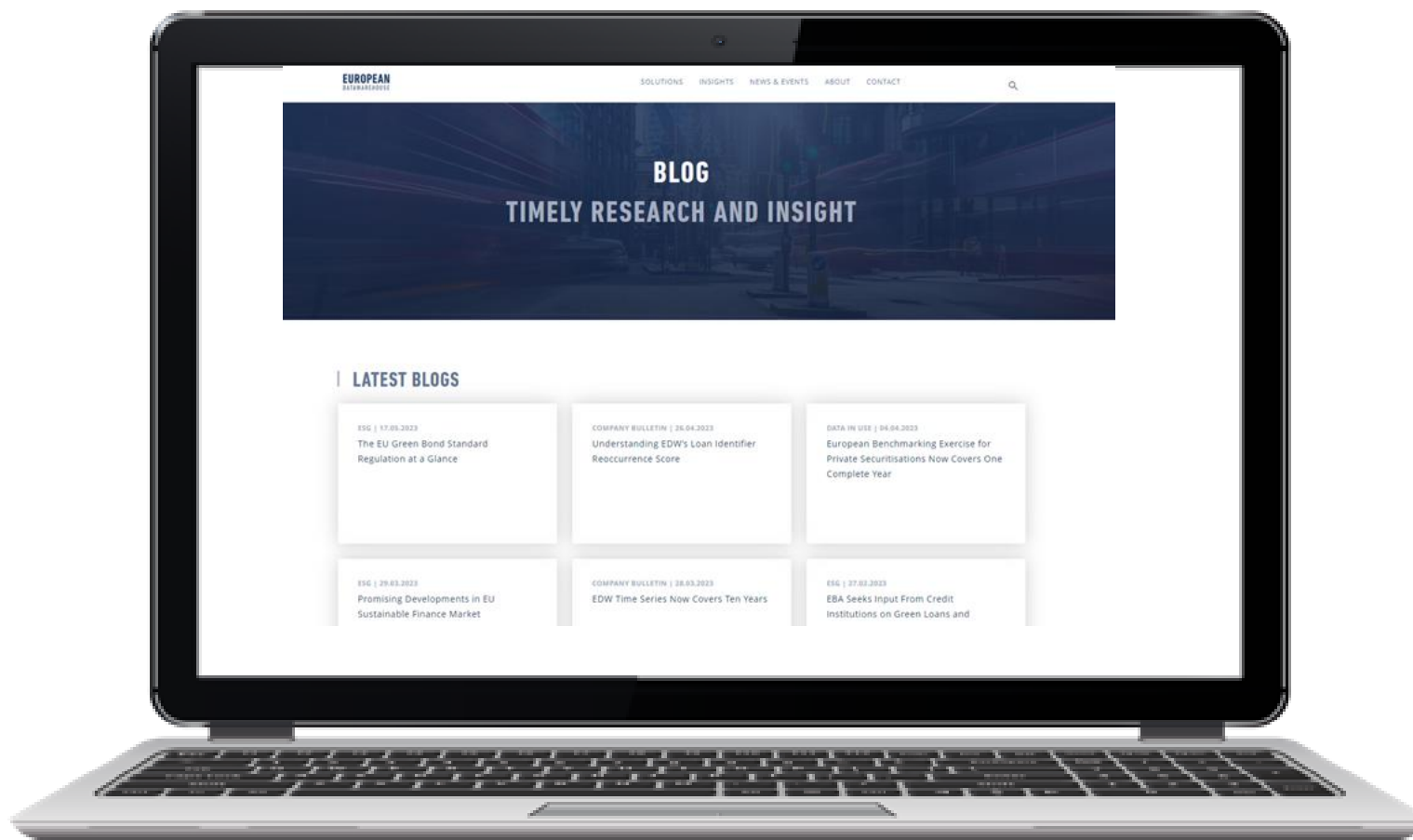
Our own publications, plus third-party research <https://eurodw.eu/knowledge/research/>



<https://eurodw.eu/knowledge/magazine//>

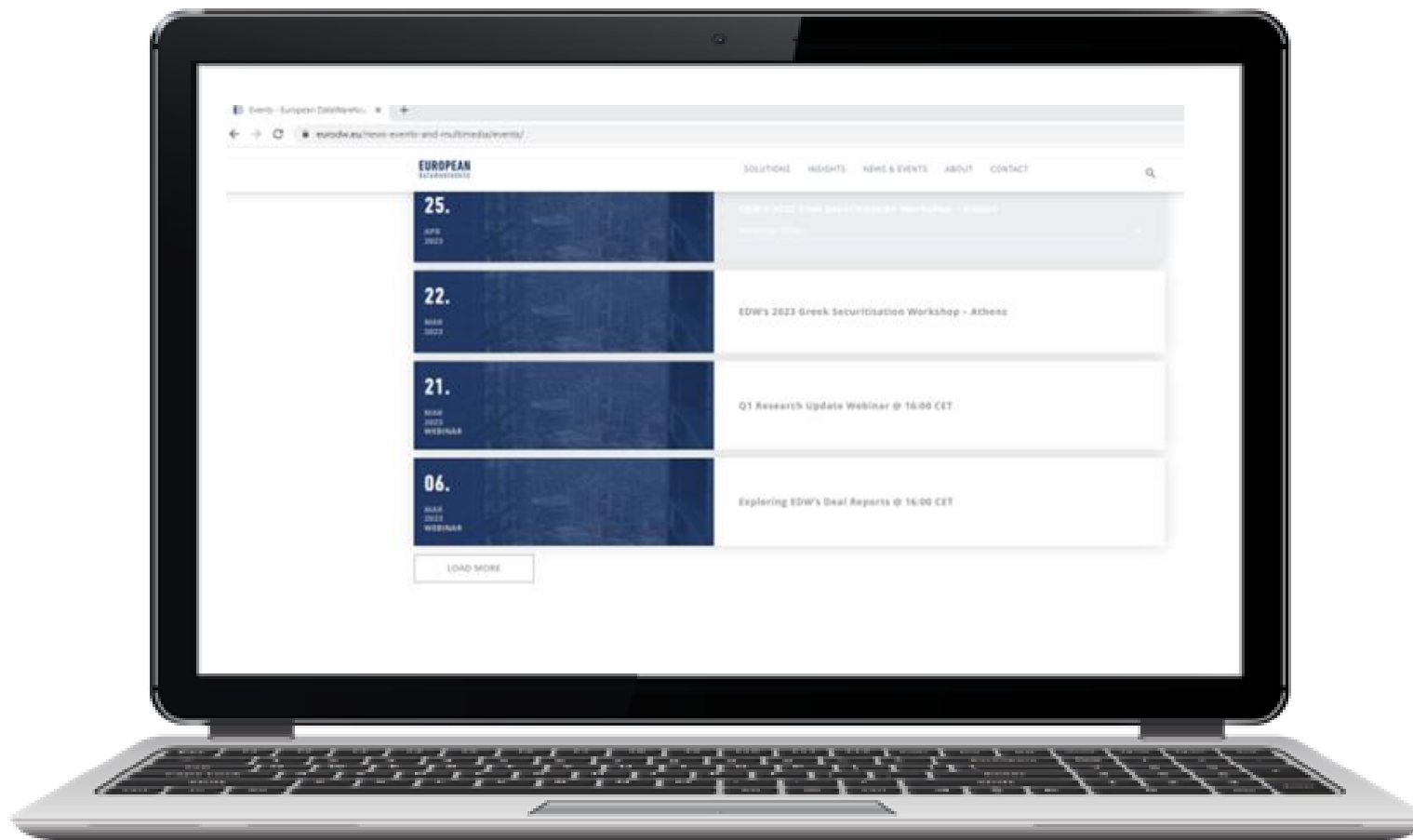
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What is European DataWarehouse?

European DataWarehouse on the Securitization Regulation (condensed version)

European DataWarehouse on the Securitization Regulation (full length version)

European DataWarehouse on the Securitization Regulation (versión reducida en español)

European DataWarehouse sobre el nuevo reglamento de Utilización (versión completa en español)

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<https://eurodw.eu/about-us/media-library/>

DECEMBER 2023

YEAR	MONTH	TITLE	PUBLISHER	PUBLICATION TYPE	KEYWORDS	ACCESSIBILITY	EDWTHIRD PARTY
2022	July	European Systemic Risk Board (ESRB) Monitoring System for ESRB	ESRB	Central bank publication	Systemic risk, securitization	Direct	Central bank
2022	June	Spring 2022 Research Outlook	EDW (Guest speaker from University of Waterloo)	Webinar	Loan performance, data availability, energy performance, adjusted database	Direct	EDW
2022	June	Deutsche Bundesbank discussion paper: on the impact of the COVID-19 pandemic on the securitization market	Deutsche Bundesbank	Central bank publication	ABS/SME, revolving transactions	Direct	Central bank
2022	May	Moody's Investors Service, ESG data and credit data quality	Moody's	Data comment	ESMA reporting standards	Restricted	Rating agency
2022	April	Introducing the EDW adjusted Database	EDW	Webinar	Adjusted database	Direct	EDW
2022	February	New Year 2022 Research Outlook	EDW	Webinar	Loan performance, energy performance, adjusted database, COV	Direct	EDW
2022	February	EDW Report ESG Impact: Impact on the market	EDW	Data comment	ESG, sustainable finance, data availability	Direct	Others
2021	December	Winter 2021 Research Outlook	EDW (Guest speaker from European Central Bank)	Webinar	Loan defaults, machine learning, RMBS prepayments, forecasting	Direct	EDW
2021	November	November 2021 - from the ESRB to the ESRB's Monitoring System	ESRB (ESRB in HMPOTAT)	COVID impact	COVID impact, mortgage, mortgage	Direct	Others
2021	October	Journal of Financial Economics, Forecasting Loan Defaults	Journal of Financial Economics	Academic publication	mortgage defaults, machine learning	Direct	Academic Publication
2021	September	Summer 2021 Research Outlook	EDW	Webinar	COVID, mortgage, credit risk and COVID	Direct	EDW
2021	May	Spring 2021 Research Outlook	EDW	Webinar	Data availability, COVID, Energy efficiency, payment holidays	Direct	EDW
2021	May	Journal of Real Estate Finance & Economics	The Journal of Real Estate Finance & Economics	Academic publication	mortgage defaults, energy efficiency	Direct	Academic Publication
2021	May	Data Availability Report Q4 2020	EDW	Data comment	Data availability	Direct	EDW
2021	March	Monitoring the Impact of COVID-19 Q1 2021 RMBS Report	EDW	COVID impact	COVID impact, mortgage, mortgage	Direct	EDW
2021	February	New Year 2021 Research Outlook	EDW (Guest speaker from European Central Bank)	Webinar	COVID, RMBS performance, loan amortisation, Cover your assets	Direct	EDW
2021	February	Monitoring the Impact of COVID-19 Q1 2021 RMBS Tracker	EDW	COVID impact	COVID impact, mortgage, mortgage	Direct	EDW
2020	December	COVID-19 Outlook	EDW	Webinar	COVID, loan performance, payment holiday, reporting practices	Direct	EDW
2020	December	COVID-19: What has Borrowed More from COVID-19? AUC Loan	EDW	COVID impact	COVID impact, auto loans, mortgages	Direct	EDW
2020	December	COVID-19: Safety of Payment Holiday Reporting Practices in EU	EDW	COVID impact	COVID impact, mortgage	Direct	EDW
2020	November	Moody's Investors Service, 2020 Year of the Credit Mortgage Market	Moody's	COVID impact	COVID impact, mortgage, mortgage	Restricted	Rating agency
2020	November	Monitoring the Impact of COVID-19 Q4 2020 RMBS Tracker	EDW	COVID impact	COVID impact, mortgage, auto loans	Direct	EDW
2020	September	Credit Performance Review	EDW	COVID impact	COVID impact, implied payment holidays	Direct	EDW
2020	August	Monitoring the Impact of COVID-19 Q3 2020 RMBS Tracker	EDW	COVID impact	COVID impact, mortgage, mortgage	Direct	EDW
2020	July	Market Outlook and Review, Consumer The Impact of COVID-19	Academic Publication	Academic publication	security design, asset backed securities, retention, moral hazard	Direct	Academic Publication
2020	June	Thematic Report: Systemic Risk and Bank Risk Rating	Academic Publication	Academic publication	TLTRO, Unconventional Monetary Policy, Credit Risk, Bank Capital	Direct	Academic Publication
2020	June	Monitoring the Impact of COVID-19 Q2 2020 RMBS Tracker	EDW	COVID impact	First time delinquencies, auto, consumer, loans, RMBS	Direct	EDW
2020	February	Data Timing and Timeliness	EDW	Data comment	Reporting lag, data timeliness	Direct	EDW
2019	December	Gas and Gas Income 2.0 and 3.0	EDW	Data comment	ESMA data in ECR data	Direct	EDW
2019	November	Index Index, Insights from European DataWarehouse	EDW	Data comment	RMBS Index Spain	Direct	EDW
2019	November	Index Index, Insights from European DataWarehouse	EDW	Data comment	RMBS Index Spain	Direct	EDW
2019	October	ESBIE, The Impact of Securitization on Global Rates of Securitization	ESRB	Central bank publication	loan defaults, lending standards, residential real estate, loan loss	Direct	Central bank

INVENTORY OF EDW-RELATED PUBLICATIONS

YEAR	MONTH	TITLE	PUBLISHER	PUBLICATION TYPE	KEYWORDS	ACCESSIBILITY
2023	April	Understanding EDW's Loan Identifier Recurrence Score	EDW	Special Report	Loan ID Recurrence, 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 Securitizations	AFME/EDW/TSI	EBE	Private securitization 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 Mortgage: Constraints on European Auto ABS: German Portfolio Transition to Alternatively Fueled Vehicles	DBRS	Credit research	European Auto ABS	Restricted
2022	August	Maria Simonovic, Sergio Macoskovic, Daniel Paravito: Credit Fire Sales: Capital 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 Securitization Market	ESRB	Central bank publication	Systemic risk, securitization	Direct
2022	June	Spring 2022 Research Webinar	EDW (Guest speaker from Universität)	Webinar	Loan performance, data availability, energy performance, adjusted	Direct
2022	June	Deutsche Bundesbank discussion paper on the replenishment of ABS backed by SME loans	Deutsche Bundesbank	Central bank publication	ABS SME, revolving transactions	Direct
2022	May	Moody's Investors Service: ESMAs 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, COA	Direct
2022	February	AFME Report: ESG securitization 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	Huonon 2021 from the IMF-ECBC (European Mortgage Federation - European Covered Bond Council)	IMF-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	mortgage defaults, machine learning	Direct
2021	September	Summer 2021 Research Webinar	EDW	Webinar	COVID, moratoria, credit risk and COVID	Direct
2021	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	Academic publication	mortgage defaults, energy efficiency	Direct
2021	May	Data Availability Report Q1 2020	EDW	Data comment	Data availability	Direct
2021	March	Monitoring the Impact of COVID-19: Q1 2020 RMBS Report	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct
2021	February	New Year 2021 Research Webinar	EDW (Guest speaker from European)	Webinar	COVID, RMBS performance, Loan amortization, Cover your assets	Direct
2021	February	Monitoring the Impact of COVID-19: Q1 2020 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct
2020	December	COVID-19 Update	EDW	Webinar	COVID, loan performance, payment holiday, reporting practices	Direct
2020	December	COVID-19: Who Has Benefited Most from COVID-19 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	Matthias Hübner and Werner Dierckx: The Impact of SLM 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 Panagariu: Wealth Recaptalization and Bank Risk-Taking: Evidence from TLTDs	Academic Publication	Academic publication	TLTD, Unconventional Monetary Policy, Credit Risk, Bank Capital	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	ESR Index: Insight from European Data Warehouse	EDW	Data comment	RPI 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 publication	loan defaults, lending standards, residential real estate, loan-level	Direct
2019	October	Bank of Spain: Beyond the LTV Ratio: New Macroeconomic Lessons from Spain	Bank of Spain	Central bank publication	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, interest	Direct
2019	September	Data Availability Report (2019 - Q1) (Excel)	EDW	Data comment	Data availability, ABS, SME, RMBS, Auto, Leases, Consumer	Direct

[Excel Available in our Media Library Section](#)

THIRD-PARTY RESEARCH PUBLICATIONS (1)

Using mortgage (RMBS) data

[The Impact of Lending Standards on Default Rates of Residential Real Estate Loans](#)

"This paper analyses the impact of lending standards for residential real estate (RRE) loans on default rates..." (J.Gaudêncio, A. Mazany, C. Schwarz), ECB occasional paper 220, March 2019

[Navigating the Housing Channel of Monetary Policy Across Euro Area Regions](#)

"This paper assesses the role of the housing market in the transmission of conventional and unconventional monetary policy across euro area regions..." (N. Battistini, M. Falagiarda, A. Hackmann, M. Roma), ECB working paper 2752, November 2022

[Forecasting Loan Default in Europe with Machine Learning](#)

"We compare the performance of a set of machine learning algorithms relative to the logistic regression, finding that they perform significantly better in providing predictions. " (L. Barbaglia, S. Manzan, E. Tosetti), July 2021

[Building's Energy Efficiency and the Probability of Mortgage Default: The Dutch Case](#)

"We investigate the relationship between building energy efficiency and the probability of mortgage default" (M. Billio, M. Costola, L. Pelizzon, M. Riedel), May 2021, The Journal of Real Estate Finance and Econometrics

THIRD-PARTY RESEARCH PUBLICATIONS (2)

Using auto data

[Credit Fire Sales: Captive Lending as Liquidity in Distress](#)

“We study the role of captive finance in the car loan market when manufacturers’ liquidity demand increases” (M. Benetton, S. Mayordomo, D. Paravisini), Banco de Espana, April 2021

[Do Lenders Price the Brown Factor in Car Loans? Evidence from Diesel Cars](#)

“Using car loan-level data we study whether banks adjust their lending terms and conditions in response to different shocks to the perceived environmental quality of diesel vehicles” (W. Beyene, M. Falagiarda, S. Ongena, A. Scopelliti), Swiss Finance Institute, Oct 2022

[Climate Risk Measurement of Assets Eligible as Collateral for Refinancing Operations – Focus on Asset Backed Securities](#)

“This report describes an exploratory study regarding exposure to climate risk of ABS, an asset class frequently pledged as collateral in the ECB refinancing operations” (L. Andre, A. Grept, N. Laut, G. Plantier, Z. Sapay-Triomphe, P.F. Weber), Banque de France, January 2022

THIRD-PARTY RESEARCH PUBLICATIONS (3)

Using Credit Cards Data

[Social traits and Credit Car Default: A Two-Stage Prediction Framework](#)

“Over the past years, studies shed light on how social norms and perceptions potentially affect loan repayments, with overtones for strategic default. Motivated by this strand of the literature, we incorporate collective social traits in predictive frameworks on credit card delinquencies” (C. Gaganis, P. Papadimitri, F. Pasiouras, M. Tasiou), Annals of Operations Research, July 2022

Using SME Data

[Better be Careful: The Replenishment of ABS Backed by SME Loans](#)

“The purpose of this paper is to reveal whether banks select loans of lower quality for portfolio replenishment than for initial securitization” (A. Fenner, P. Klein, C. Mössinger) Deutsche Bundesbank, 2021

Using multiple asset classes

[Textual Disclosure in Prospectuses and Investors' Security Pricing](#)

“We explore the impact of textual disclosures' quality and quantity, measured as the share of boilerplate language, the linguistic complexity, and the disclosure length, on investors' security pricing at issuance.” (J. Debener, A. Fenner, P. Klein, S. Ongena)

VERIFY YOUR ACCESS RIGHTS...

CHECK ACCESS RIGHTS

Data access types

- Due to EDW market share, tariffs for access to EDW data is determined by user type:
 - Rating agency vs data vendor vs active market participant vs universities
 - Data access for universities is now €3000 per year, automatically renewable

University access allows

- Conduct and publish academic research using EDW data, nevertheless, please let us know once a publication using EDW data is about to be published.

University access DOES NOT ALLOW

- Re-distribution (sale) of EDW raw data to third parties (this requires a different contract)
- Using the data for consulting work (this also requires a different contract)
- Publicly displaying individual data

**PLEASE READ THE CONTRACT CAREFULLY,
WHEN IN DOUBT, PLEASE CONSULT US!**

VERIFY DATA AVAILABILITY

DATA AVAILABILITY REPORT (AS OF Q4 2022)

A list of available deals and key metrics [Data Availability Report Q4 2022 - European DataWarehouse \(eurodw.eu\)](#)



THIRD PARTY RESEARCH: 13 MARCH 2023

RMBS: Not All EPCs Created Equal

THIRD PARTY RESEARCH: 31 JANUARY 2023

European Auto ABS: Have Delinquencies Hit Rock Bottom?

THIRD PARTY RESEARCH: 31 JANUARY 2023

Impact of Rising Rates on UK Mortgages

THIRD PARTY RESEARCH: 06 JANUARY 2023

Credit Scoring In SME Asset-Backed Securities: An Italian Case Study

SPECIAL REPORT: 29 NOVEMBER 2022

Bankmagazin: Den Datenschatz heben (German)

THIRD PARTY RESEARCH: 25 NOVEMBER 2022

ECB: Navigating the Housing Channel of Monetary Policy Across Euro Area Regions

EXPLANATORY REPORT: 25 NOVEMBER 2022

Data Availability Report Q2 2022

SPECIAL REPORT: 19 OCTOBER 2022

Latest Update: Report on the European Benchmarking Exercise for Private Securitisations

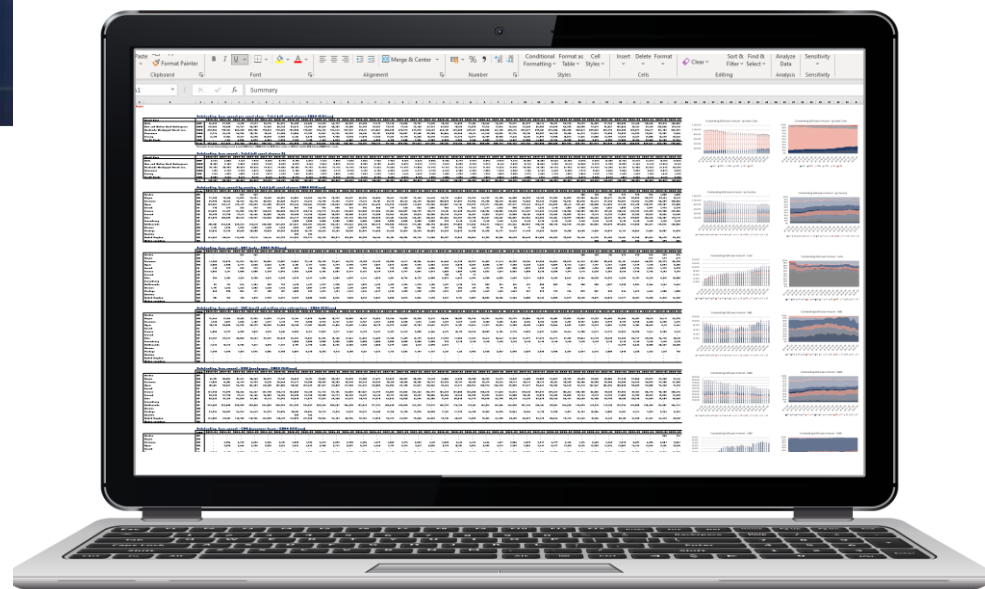
THIRD PARTY RESEARCH: 18 OCTOBER 2022

Swiss Finance Institute: Do Lenders Price the Brown Factor in Car Loans?

EXPLANATORY REPORT: 05 OCTOBER 2022

EDW Adjusted Database (Beta) Report

LOAD MORE



VERIFY DATA AVAILABILITY

Not all lenders securitise loans to the same extent in all countries

- RMBS segment is one of the most representative and diversified otherwise
- 50% of the auto segment is concentrated in Germany
- 50% of consumer loans are from Italy
- 57% of leases are from Italy
- Not all lenders are banks...

Samples dominated by 1 large securitisation

- May reflect actual market share
- In any case, large securitisations deserve specific attention...

REFER TO THE DATA AVAILABILITY REPORT

CONSULT EXISTING FIELDS

KEY COLLECTED DATA

Borrower specific data

- Anonymised info (no name or address, loan identifiers are encrypted)
- Employment type, income...

Loan characteristics

- Original amount, outstanding amount, start date, maturity date
- Repayment type (annuity, bullet etc...)
- Interest rate %, index, margin, reset frequency/dates etc...

Collateral details

- Valuation amount, date, method
- Collateral type, location
- Energy efficiency characteristics **NEW - ESMA FIELD**

Performance information

- Loan performance status (performing, arrear, default, redeemed, repurchased, liquidated)
- Days in arrears, default date, default amount, recovery, loss

OPTIONAL VS MANDATORY FIELDS

IN ECB reporting

- Some fields are mandatory and some fields are optional
- Optional fields are often not populated
- Optional fields are fields which may be required under a rating agency methodology

Report on optional fields [More is better: optional loan-level data fields provide valuable complementary information](#)

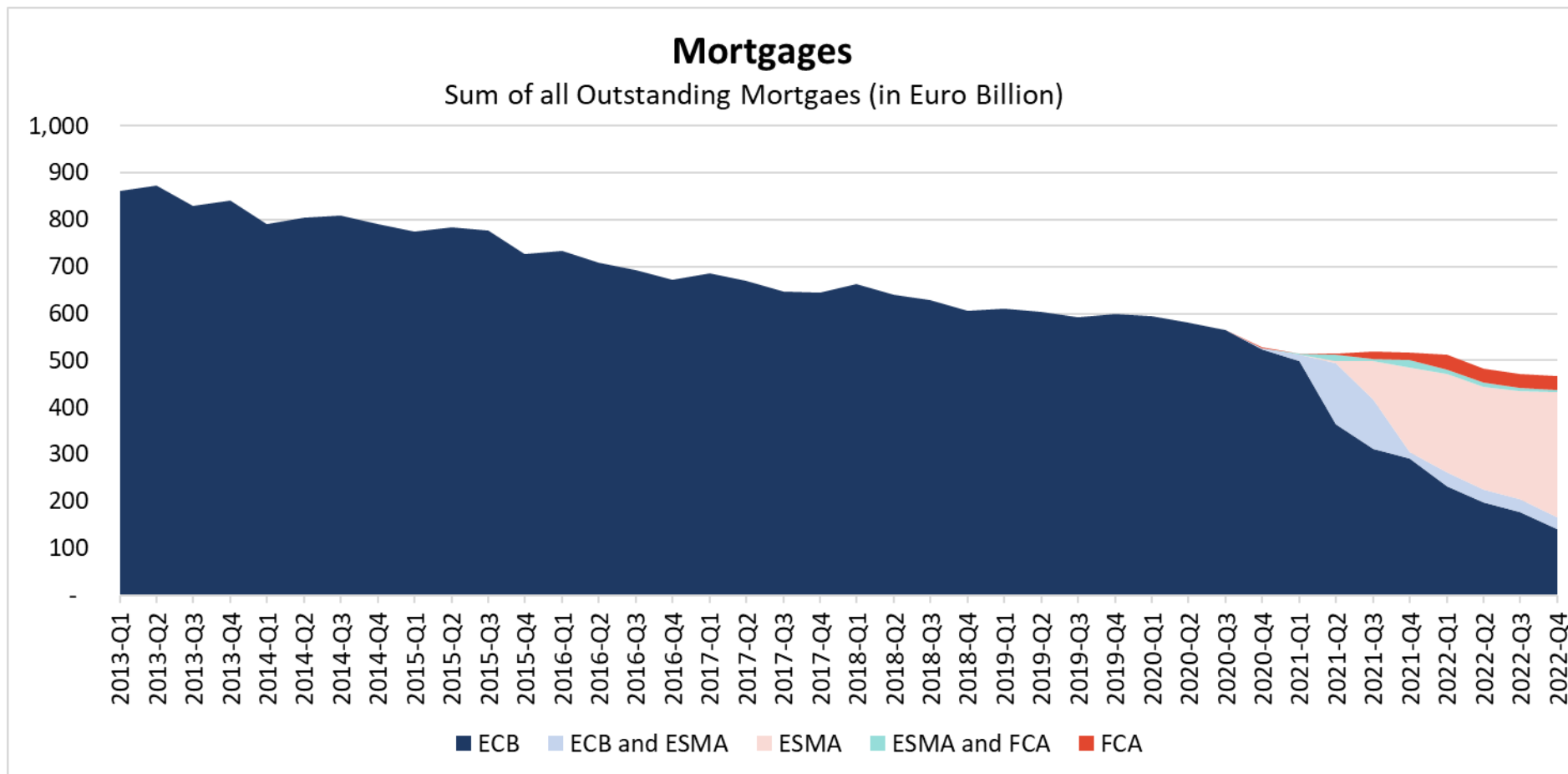
IN ESMA reporting

- Mandatory fields only
- Some new fields some ECB fields
- Optional fields are fields which may be required under a rating agency methodology

REFER TO THE DATA AVAILABILITY REPORT

REPORTING FORMATS

ECB VS ESMA VS FCA DATA AVAILABILITY



REPORTING FORMATS

ECB format (historical reporting format)

The historical reporting format, one template per asset class, dozens of fields, some mandatory some optional
50+ mandatory fields for mortgages

<https://www.ecb.europa.eu/paym/coll/loanlevel/transmission/html/index.en.html>

ESMA format (since 2020, will eventually replace the ECB format)

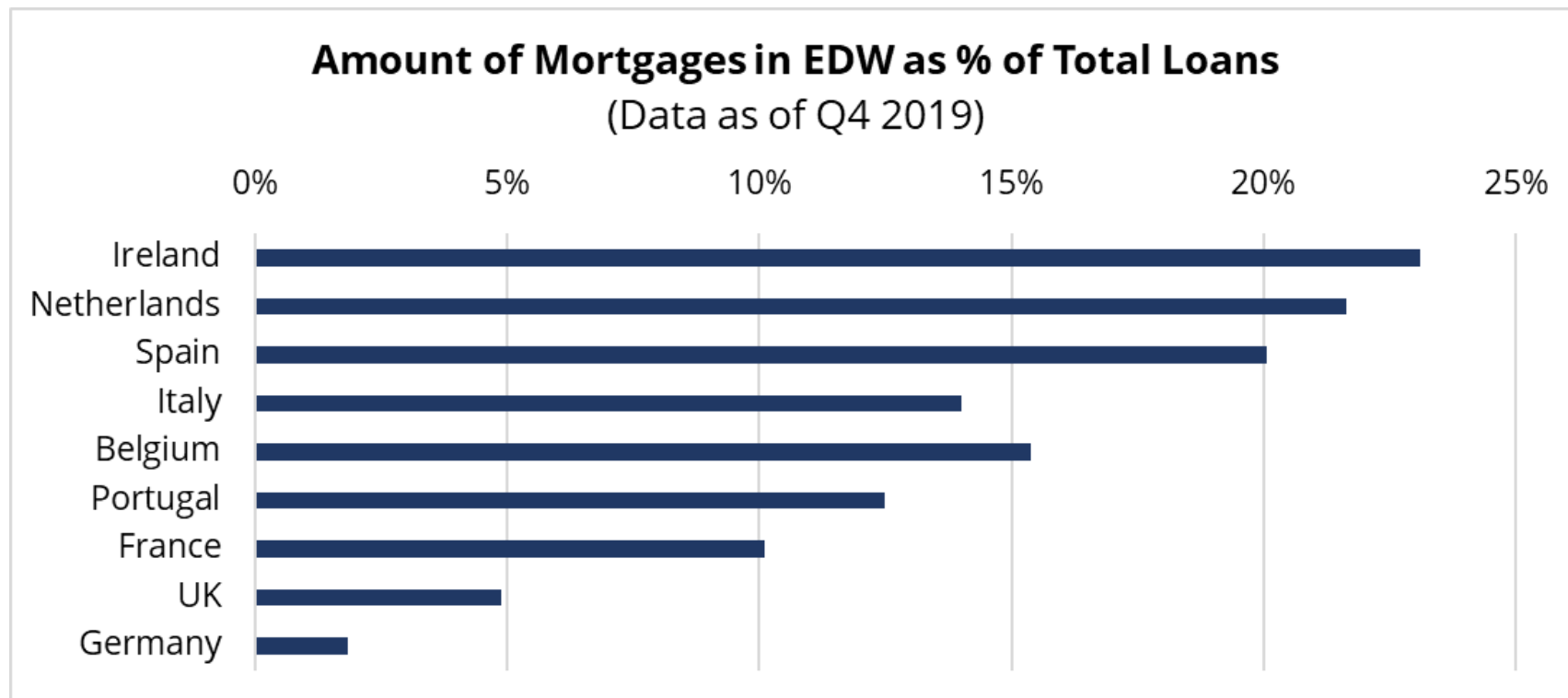
The new reporting format following the implementation of the 2017 securitisation regulation
ESMA reporting also includes a list of investor report fields

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

Report comparing ECB vs ESMA reporting formats [GAP ANALYSIS Version 3.0 AND 3.1](#)

VERIFY REPRESENTATIVITY/BIAS

REPRESENTATIVITY



Source: European DataWarehouse

DATA BIAS

Selection bias

- Securitisations typically have eligibility criteria
- Portfolios sometimes reflect the activity of specialised lenders/specific loans
- See Italy and “Cessione del Quinto” consumer loans

Survivor bias

- Loans in arrears/default typically excluded from original securitised pool
- Expect to find near 0% arrears on the first reporting date
- Is loan performance „too good to be true”? Some data providers repurchase defaulted loans
- Repaid loans are dropped from the subsequent reporting

To check

- Is income stratification consistent with country average?
- Do LTV levels, income levels, interest rate levels match market averages?
- Geographic origin of the loans should mirror economic importance of the various regions
- Are there any unusual concentrations in the sample?
 - For SME, check industry, and loan term. If all are similar, the sample is probably not representative! (e.g. In floorplan deals, all the SMEs are actually car dealers, all the same NACE code 45)
 - In „Geldilux” SME deals, all the loans are all very short-term bullet loans with a low default rate

NOT ALL SECURITISATIONS ARE A REPRESENTATIVE DATA SAMPLE

CHECK PLAUSIBILITY

DATA QUALITY DESERVES ATTENTION

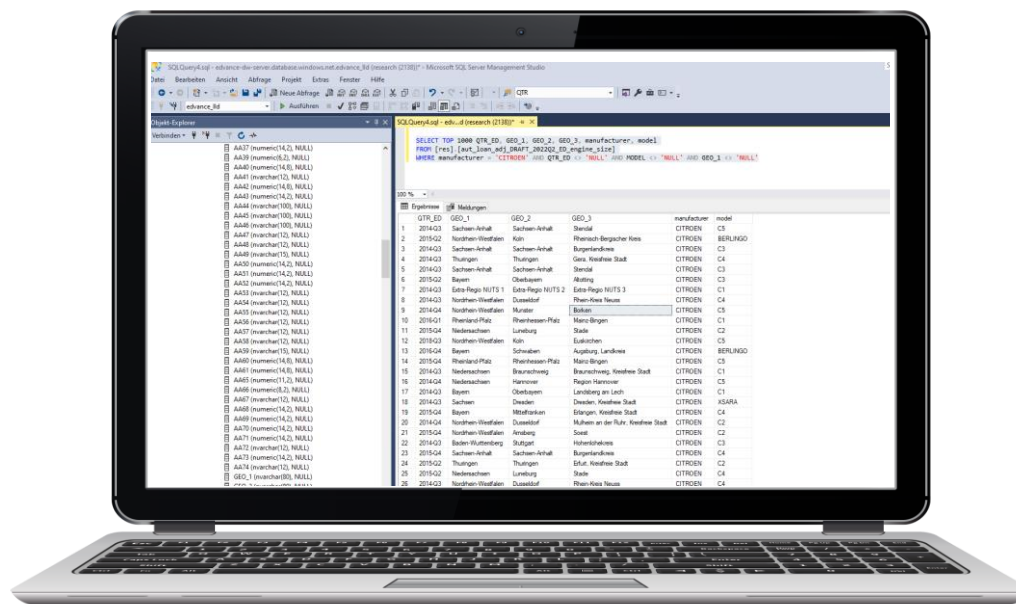
Data quality at EDW

- EDW has a team liaising with data providers to improve data quality
- Corrections affect subsequent data uploads; past uploads are often not corrected by data providers
- In ECB data, errors affect mostly 2013, 2014, 2015 data
- Early (recent) ESMA data also have data quality issues

Recommended verification work

- Check sum, minimal, maximal, mean values, order them by edcode and „as of“ date, errors stand out
- Check consistency (a defaulted loan should have a default amount and default date)
- When relying on a limited number of edcodes, compare key statistics to investor reports

ADJUSTED DATABASE REPORT



https://eurodw.eu/research_articles/edw-adjusted-database-beta-report/

BEWARE OF DATA REPORTING PECULIARITIES

Reporting frequency

- Data is uploaded quarterly at least, but some data providers report monthly
- For auto, data is often reported monthly, whereas for mortgages, it is typically quarterly
- Do not triple count data reported monthly when doing statistics!

Reporting lag

- The pool cut-off date is the „as of „date of the data
- The submission date is the upload date, when the data is actually uploaded
- There was an average lag of ca. 40 days between as of and upload date with the ECB data
- The maximum lag with the ESMA data is at most 60 days

Cf. some of our explanatory reports

[Data Timing and Timeliness](#)

[EDW Commentary on Spanish RMBS Loan-Level Data](#)

[EDW Commentary on Italian Loan Level Data](#)

[COVID-19 Survey of Payment Holiday Reporting Practices in Europe](#)

[Standardising Geographic Information for European Loan Level Data](#)

LOAN PERFORMANCE-RELATED WORK

WHEN DOING WORK INVOLVING LOAN PERFORMANCE

Performance data

- Default definition is often specific to a securitisation (in Spain 12 or 18 months)
- It may be preferable to have your own default definition to make comparisons, for instance:
 - Count as defaulted a loan that goes 3 months in arrears or is flagged as defaulted
 - Use amount outstanding at time of default as default amount,
 - Use first PCD in which the loan appears defaulted as a default date
- Losses can take a long time to materialise (particularly in Italy), some originators repurchase defaults
- Focusing on recoveries instead of losses may be a better choice
 - Compare amount of loan at time of default vs now
- Loan ID consistency should be verified when doing default/recovery/loss rates
- **See report on loan ID consistency** [Loan ID consistency](#)

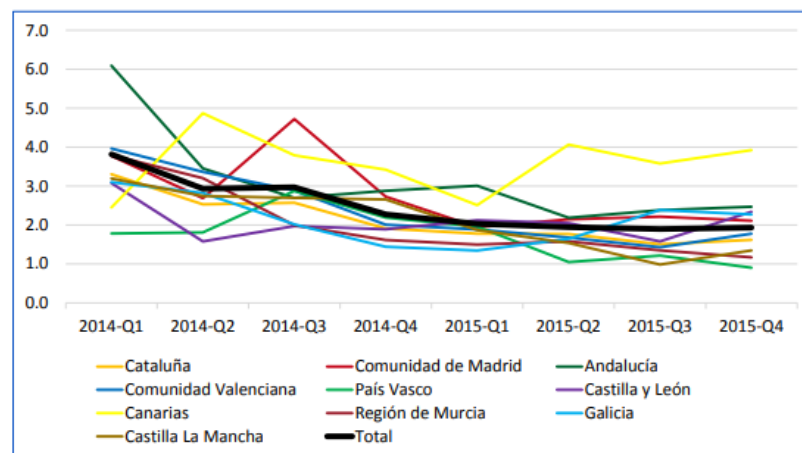
COMPARE YOUR FINDINGS TO OTHER SOURCES

PERFORMANCE RELATED EDW PUBLICATIONS

Some performance indices are also available online

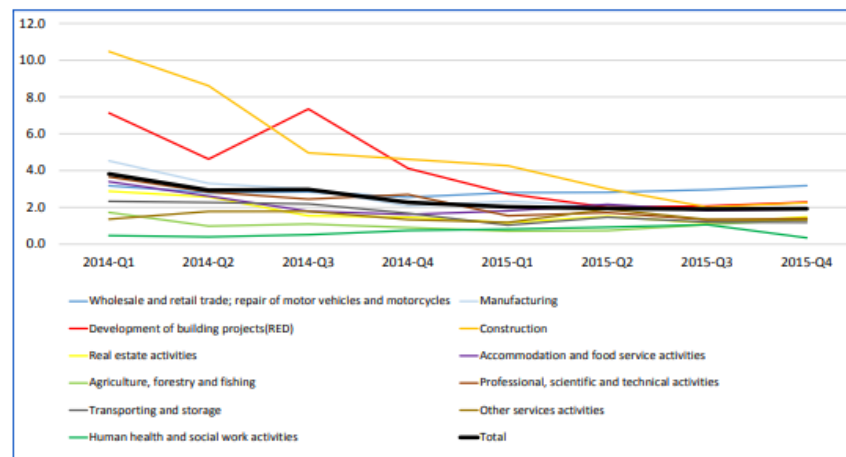
- The PDF versions with methodologies are also available online
 - [May 2016: Spanish SME Index \(PDF\)](#)
 - [August 2018: ED Spanish RMBS Index \(PDF\)](#)
 - [November 2019: Italian SME Index \(PDF\)](#)
- We recently published the EXCEL version which can now be freely downloaded
 - [October 2019: Italian SME Index Q2 2019](#)
 - [June 2019: Spanish RMBS Index Q1 2019](#)
 - [March 2018: Spanish SME Index 2018 Q4](#)

Exhibit 4b: Delinquency 90-360 days per region (as % of non-defaulted loans)



Source: European DataWarehouse

Exhibit 4c: Delinquency 90-360 days per industry (as % of non-defaulted loans)



Source: European DataWarehouse

OTHER PERFORMANCE-RELATED PUBLICATIONS

Please also refer to:

- Our report on [CDR calculation](#)
- Our various COVID-related publications
 - [Monitoring Moratoria through COVID-19](#)
 - [Monitoring the Impact of COVID-19 Q1 2021 RMBS Report](#)
 - [Monitoring the Impact of COVID-19: Q4 2020 AUTO TRACKER](#)
 - [Monitoring the Current LTV](#)
 - [Explanatory report on calculated LTVs](#)
 - [The V in LTV and why it matters](#)

BEFORE SUBMITTING YOUR RESEARCH

PLEASE CONSULT US BEFORE PUBLISHING

To avoid missing something important...

- We have unique knowledge regarding the data and the securitisation sector
- It could be that you missed something important!
- We can help to check that the results make sense
- We are happy to discuss!

PLEASE LET US KNOW WHEN YOU PUBLISH A NEW PAPER

| Q&A

AND NOW...

... DO YOUR OWN RESEARCH!

A blue-toned photograph of a snowy evergreen tree, likely a Christmas tree, decorated with warm white string lights. The lights are strung along the branches, creating a festive glow. The snow is thick and covers the branches, giving it a wintry feel. The overall mood is cozy and celebratory.

**WE WISH YOU A
WONDERFUL HOLIDAY
SEASON AND A
FANTASTIC 2024!**

THANK YOU//CONTACT

EUROPEAN DATAWAREHOUSE GMBH

Walther-von-Cronberg-Platz 2

60594 Frankfurt am Main

🌐 www.eurodw.eu

✉ enquiries@eurodw.eu

☎ +49 (0) 69 50986 9017



LUDOVIC THEBAULT, PHD

HEAD OF RESEARCH

EUROPEAN DATAWAREHOUSE

☎ +49 69 50986 9302

✉ ludovic.thebault@eurodw.eu

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