

# SPRING RESEARCH UPDATE

**21 MARCH 2023**



## ON TODAY'S CALL



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# **AGENDA**

**PUBLICATIONS**

**DATA AVAILABILITY**

**PERFORMANCE UPDATE**

**ALL-IN-ONE DATABASE / ADJUSTED DATABASE**

**AUTO CALCULATED FIELDS**

**LOAN AND BORROWER IDENTIFIERS**

**UPDATE ON THE GAS PROJECT**

**Q & A**

# PUBLICATIONS

LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

# RESEARCH SECTION

EDW publications as well as third party research: <https://eurodw.eu/knowledge/research/>

EUROPEAN DATAWAREHOUSE

SOLUTIONS INSIGHTS NEWS & EVENTS ABOUT CONTACT

## RESEARCH TIMELY RESEARCH AND INSIGHT

17 MARCH 2023  
Data Availability Report Q4 2022

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

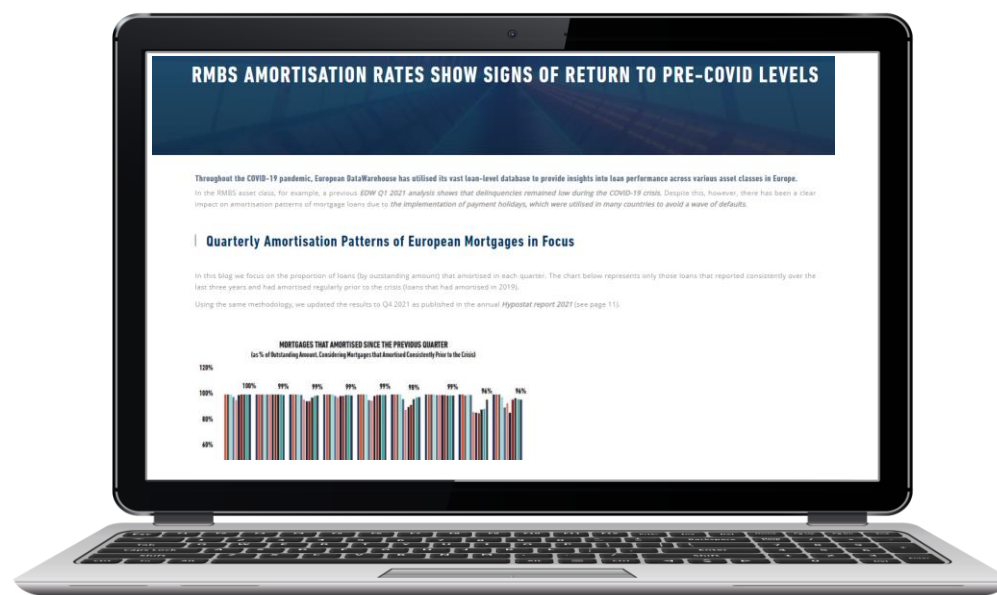
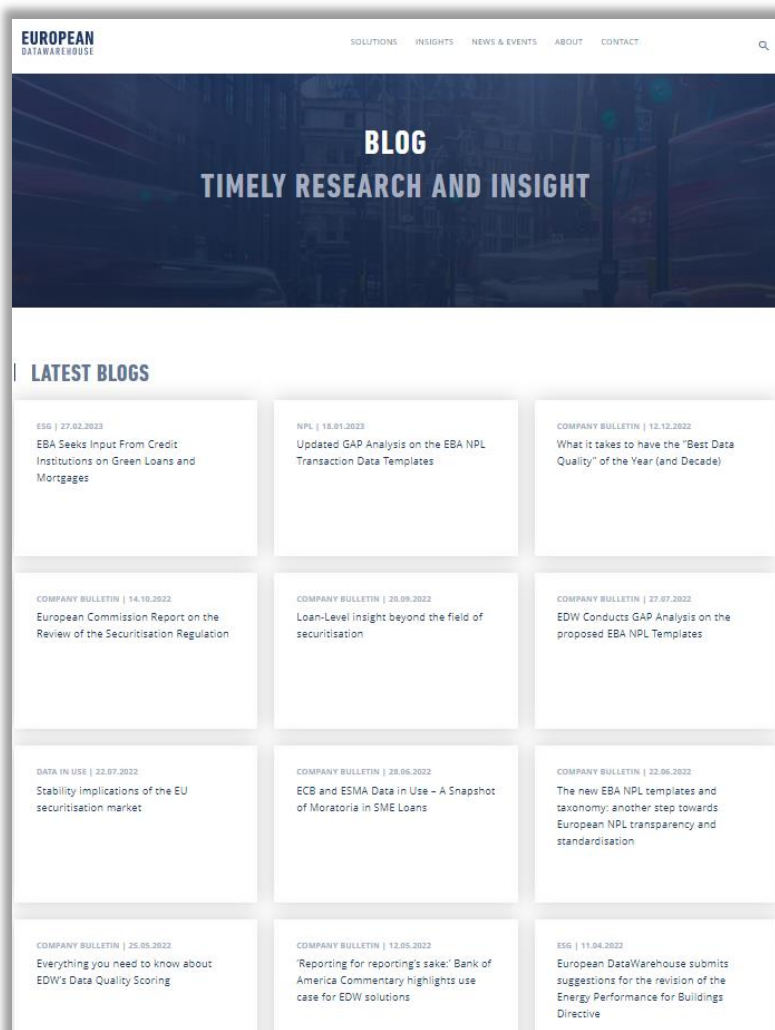
THIRD PARTY RESEARCH: 18 OCTOBER 2022  
Swiss Finance Institute: Do Lenders Price the Brown Factor in Car Loans?

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# BLOG

Concise and insightful articles: <https://eurodw.eu/knowledge/magazine/>



# WEBINARS

Slides and recordings of EDW webinars: <https://eurodw.eu/news-events-and-multimedia/events/>

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## EVENTS

STAY IN THE LOOP

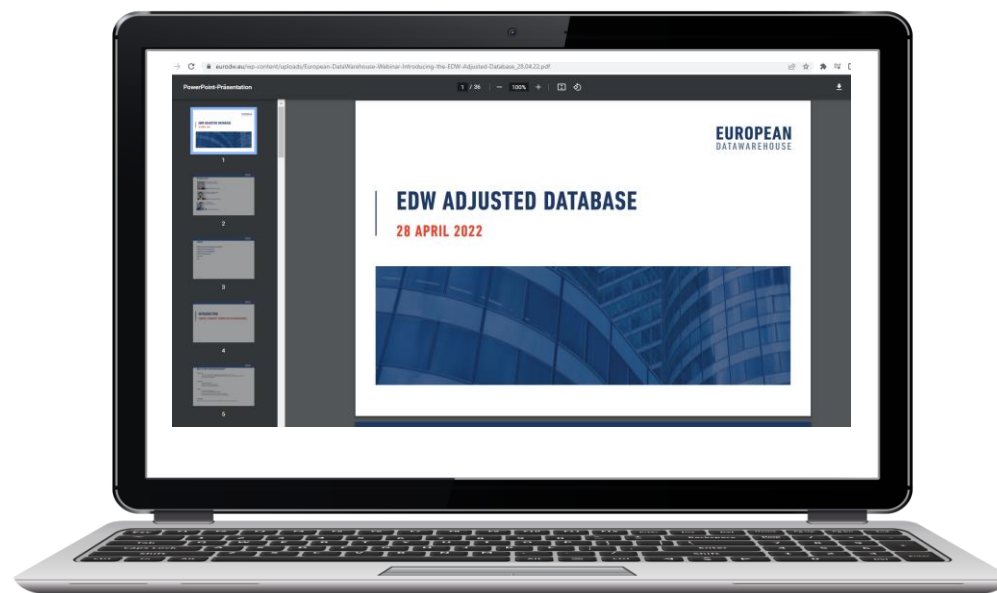
### UPCOMING EVENTS

21. MARCH 2023 WEBINAR	Research Update webinar @ 16:00 CET
22. MARCH 2023	EDW's 2023 Greek Securitisation Workshop - Athens
25. APRIL 2023	EDW's 2023 Irish Securitisation Workshop - Dublin
09. MAY 2023	EDW's 2023 Spring Italian Workshop - Rome
11. MAY 2023	EDW's 2023 Spring Italian Workshop - Milan

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### ARCHIVED EVENTS

06.	
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# LIST OF PUBLICATIONS

Our own publications, plus third party research [Media Library - European DataWarehouse \(eurodw.eu\)](https://www.eurodw.eu)

The screenshot shows the top navigation bar with 'EUROPEAN DATAWAREHOUSE' logo and links for SOLUTIONS, INSIGHTS, NEWS & EVENTS, ABOUT, and CONTACT. The main header features the text 'MEDIA LIBRARY' over a dark architectural background. Below this, there is a 'VIDEOS' section with two video thumbnails. The first video is titled 'What is European DataWarehouse?' and the second is 'European DataWarehouse on the Securitisation Regulation (condensed version)'. A 'SHOW MORE' button is located below the second video. Underneath the videos is the 'CORPORATE INFORMATION AND PUBLICATIONS' section, which lists several documents with dates and titles, each followed by a right-pointing arrow:

- 07 MARCH 2023: Corporate Presentation →
- 07 MARCH 2023: ABS Market Coverage →
- 07 MARCH 2023: Solutions for Private Deals and CLOs →
- 06 MARCH 2023: ISIN List →
- 01 MARCH 2023: Solutions for Investors and Data Users →
- 31 JANUARY 2023: List of Research Publications →

The laptop screen displays a table titled 'INVENTORY OF EDW-RELATED PUBLICATIONS'. The table has columns for YEAR, MONTH, TITLE, PUBLISHER, PUBLICATION TYPE, KEYWORDS, ACCESSIBILITY, and EDW THIRD PARTY. The table contains 28 rows of publication data, including titles like 'European Systemic Risk Board (ESRB) Monitoring System', 'Spring 2022 Research Webinar', and 'What is European DataWarehouse?'. The table is filtered to show 'Direct' accessibility and 'Central bank' as the third party.

YEAR	MONTH	TITLE	PUBLISHER	PUBLICATION TYPE	KEYWORDS	ACCESSIBILITY	EDW THIRD PARTY
2022	July	European Systemic Risk Board (ESRB) Monitoring System	ESRB	Central bank publication	Systemic risk, securitisation	Direct	Central bank
2022	June	Spring 2022 Research Webinar	EDW (Guest speaker from Universite Webinar)	Webinar	Loan performance, data availability, energy performance, adjusted database	Direct	EDW
2022	June	European Systemic Risk Board (ESRB) Monitoring System	ESRB	Central bank publication	ABS SME, revolving investments	Direct	Central bank
2022	May	Moody's Investor Service (MIS) - What will cause data quality, &	Moody's	Data comment	EDMA reporting standards	Restricted	Rating agency
2022	April	Introducing the EDW adjusted Database	EDW	Webinar	Adjusted database	Direct	EDW
2022	February	New Year 2022 Research Webinar	EDW	Webinar	Loan performance, energy performance, adjusted database, COV	Direct	EDW
2022	February	ESG Reporters ESG on transition: revenue concerns 27th Feb	ESG	Data comment	ESG, sustainable finance, data availability	Direct	Others
2021	December	Winter 2021 Research Webinar	EDW (Guest speaker from European Webinar)	Webinar	Loan defaults, machine learning, RMBS prepayments, forecasting	Direct	EDW
2021	November	Winter 2021 - From the IMF-ECBC (European Mortgage Focus)	IMF-ECBC (EDW in HYPOSTAT)	Academic publication	COVID impact, moratoria, mortgages	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 Webinar	EDW	Webinar	COVID, moratoria, credit risk and COVID	Direct	EDW
2022	May	Spring 2021 Research Webinar	EDW	Webinar	Data availability, COVID, Energy efficiency, payment holidays,	Direct	EDW
2021	May	Journal of Real Estate Finance & Economics Building Energy	The Journal of Real Estate Finance & Economics	Academic publication	mortgage defaults, energy efficiency	Direct	Academic Publication
2021	May	Q4 Analysis Report Q4 2020	EDW	Data comment	Data availability	Direct	EDW
2021	March	Monitoring the Impact of COVID-19: Q1 2021 RMBS Report	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2021	February	New Year 2021 Research Webinar	EDW (Guest speaker from European Webinar)	Webinar	COVID, RMBS performance, Loan amortisation, Cover your assets	Direct	EDW
2021	February	Monitoring the Impact of COVID-19: Q1 2021 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2020	December	COVID-19 Impact	EDW	Webinar	COVID, loan performance, payment holiday, reporting practices	Direct	EDW
2020	December	COVID-19: Who Has Benefited Most from COVID-19? Auto Loan	EDW	COVID Impact	COVID impact, auto loans, mortgages	Direct	EDW
2020	December	COVID-19: Survey of Payment Holiday Reporting Practices in EU	EDW	COVID Impact	COVID impact, moratoria	Direct	EDW
2020	November	Moody's Analysis COVID-19: 3rd View of the Dutch Mortgage	Moody's	COVID Impact	COVID impact, Netherlands mortgages	Restricted	Rating agency
2020	November	Moody's Analysis Contract Status of the U.S. Mortgage Market	Moody's	Credit research	COVID impact, mortgages	Restricted	Rating agency
2020	November	Monitoring the Impact of COVID-19: Q4 2020 AUTO Tracker	EDW	COVID Impact	COVID impact, moratoria, auto loans	Direct	EDW
2020	September	Credit Performance Review	EDW	COVID IMPACT	COVID impact, implied payment holidays	Direct	EDW
2020	August	Monitoring the Impact of COVID-19: Q3 2020 RMBS Tracker	EDW	COVID Impact	COVID impact, moratoria, mortgages	Direct	EDW
2020	July	Martin Hibbert and Werner Oberdorfer: The Impact of S&P 500	Academic Publication	Academic publication	security design, asset-backed securities, retention, moral hazard	Direct	Academic Publication
2020	June	Thomas Davignon: Search Recaptulation and Bank Risk Taking	Academic Publication	Academic publication	TFRD, Unconventional Monetary Policy, Credit Risk, Bank Capital	Direct	Academic Publication
2020	June	Monitoring the Impact of COVID-19: Q2 2020 Impact	EDW	COVID Impact	First time delinquencies, auto, consumer, leases, RMBS	Direct	EDW
2020	February	Bank Terms and Conditions	EDW	Data comment	Reporting lag, data timeliness	Direct	EDW
2019	December	Site analysis, version 3.0 and 3.1	EDW	Data comment	EDMA data in ECB data	Direct	EDW
2019	November	BSU Index: Insights from European Datawarehouse	EDW	Data comment	BSU Index Spain	Direct	EDW
2019	November	Index TFRD Index	EDW	SDG performance	Index, S&P performance	Direct	EDW
2019	October	ECB: The Impact of Lending Standards on Default Rates of Assets	ECB	Central bank publication	loan defaults, lending standards, residential real estate, loan-loss	Direct	Central bank



# DATA AVAILABILITY REPORT (Q4 2022 UPDATE)

**LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE**

# LATEST DATA AVAILABILITY REPORT NOW ONLINE

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

**EUROPEAN DATAWAREHOUSE** SOLUTIONS INSIGHTS NEWS & EVENTS ABOUT CONTACT

## DATA AVAILABILITY REPORT Q4 2022

European DataWarehouse's (EDW) database contains nearly ten years of data representing most of Europe's public securitisations.

The **Q4 2022 Data Availability Report** provides quarterly statistics on the outstanding number of active securitisations, loan amounts, number of loans, and borrowers, as well as loan level data (LLD) uploads to our database. The report is drilled down to show the outstanding amounts over time for more than 1600 securitisations.

As of Q4 2022, the outstanding number of loans in our database totalled 39.3 million, with a value of almost €0.8 trillion from 14 European countries.

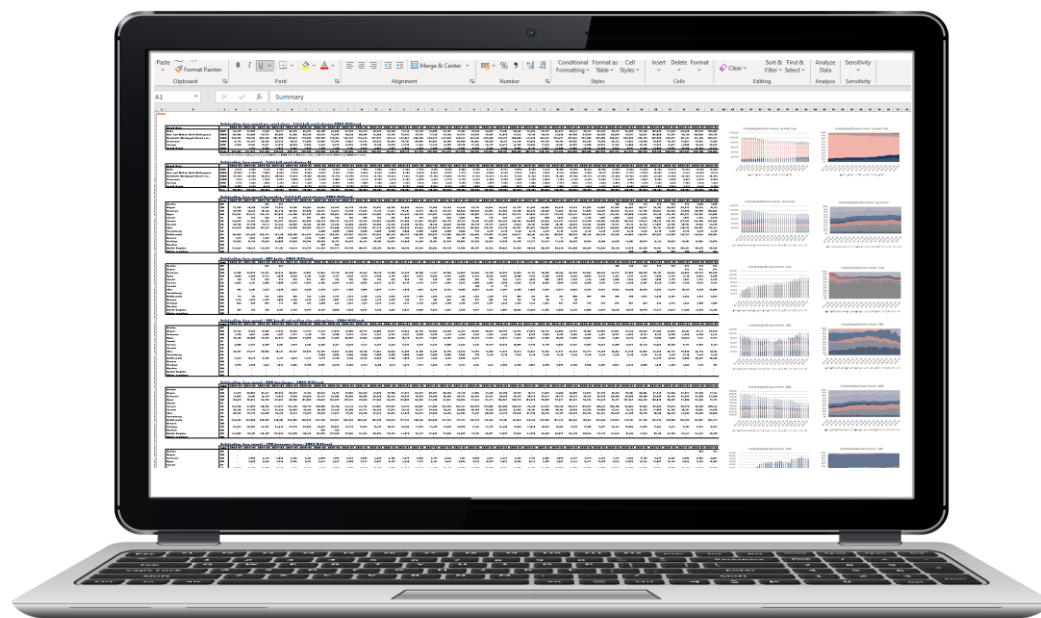
### Outstanding EUR Loan Amount - by Asset Class

Legend: AUT, SME, CMB, RMB, CMR, LES, CRE

The values for these loan amounts are adjusted for errors (dummy values, decimal points inconsistencies) observed in the oldest uploads. Currencies have been converted when loan amounts were reported in a currency other than the Euro.

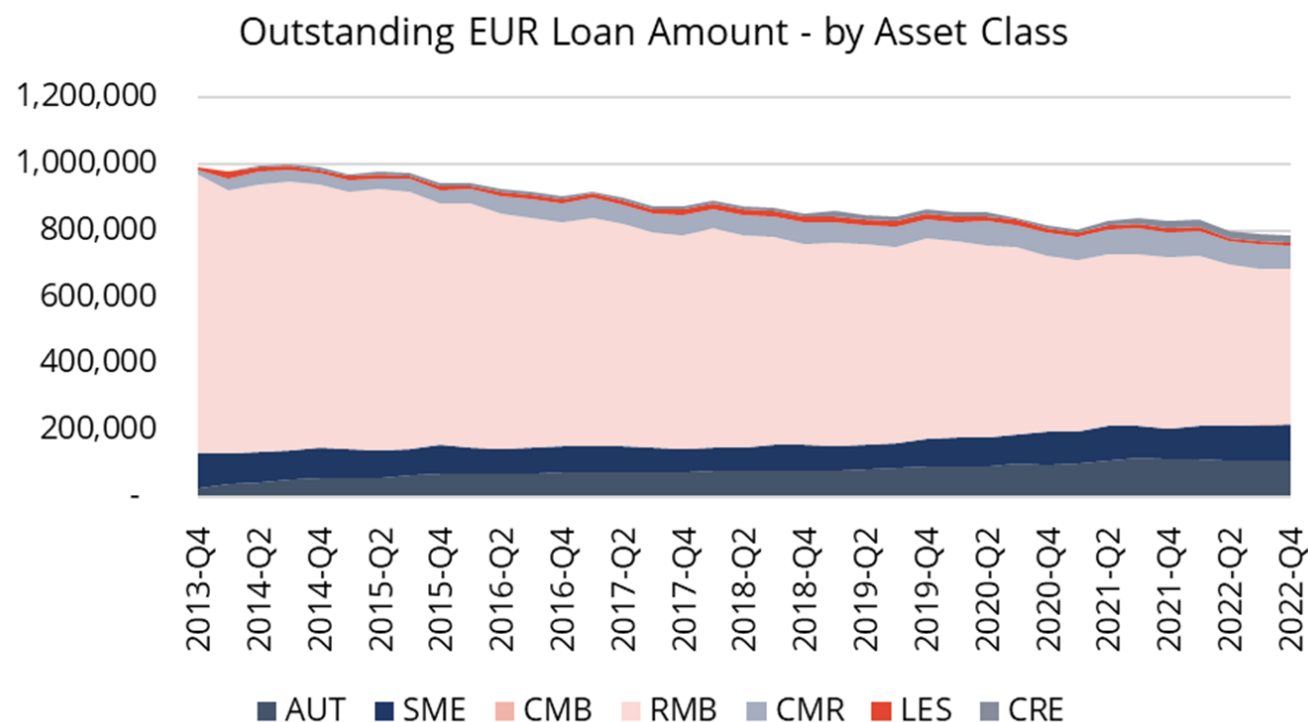
Thanks to our comprehensive coverage of the entire European public securitisation market, EDW's data reflects the peculiarities of the various securitisation markets, jurisdictions, and data providers.

Please note that securitisation does not matter equally in all countries and to all lenders. While mortgage securitisations are found in most countries, not all countries are equally represented. This is also the case with other asset classes. For instance, Germany accounts for 51% of all auto loan amounts, and Italy represents a substantial share of European consumer loans (50%) and leases (57%).

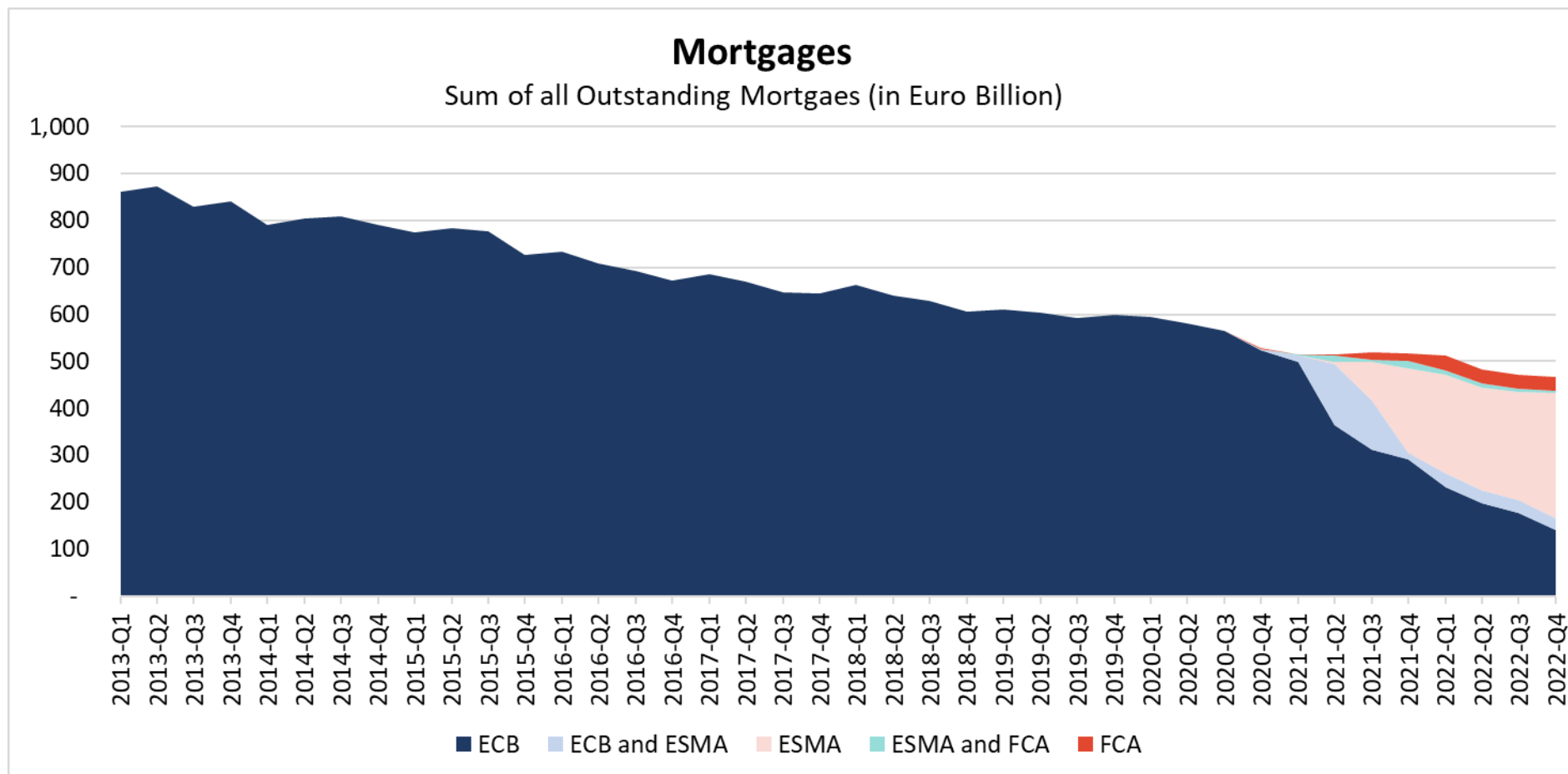


## ESMA VS ECB DATA AVAILABILITY (Q4 2022)

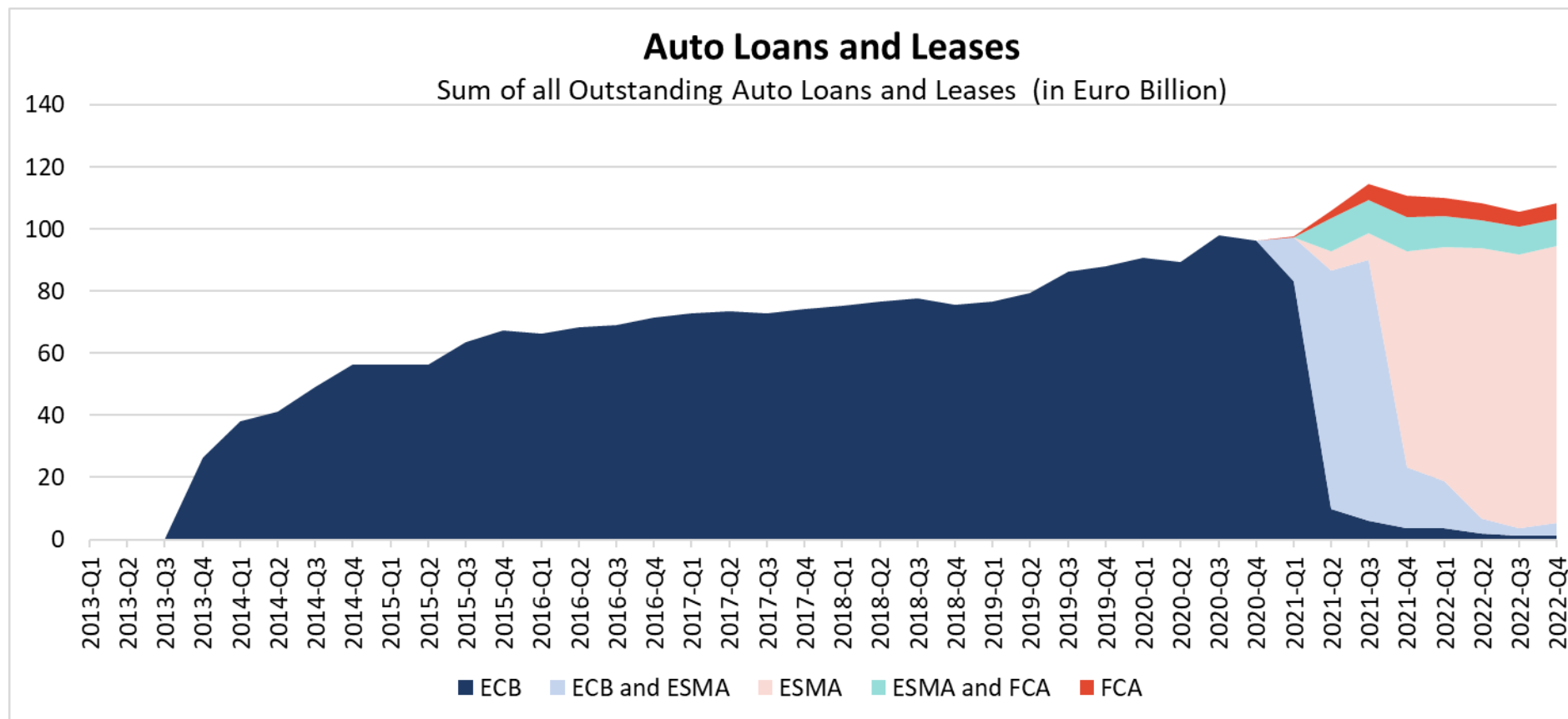
- Not all asset classes are equally representative or diversified
- Securitised loans are not necessarily representative
- Outstanding amount at 785 billion as of Q4 2022
  - Decrease mostly due to reduction in the RMBS asset class
  - SME and Auto asset classes close to highest levels
  - Recent decrease in Leasing asset class



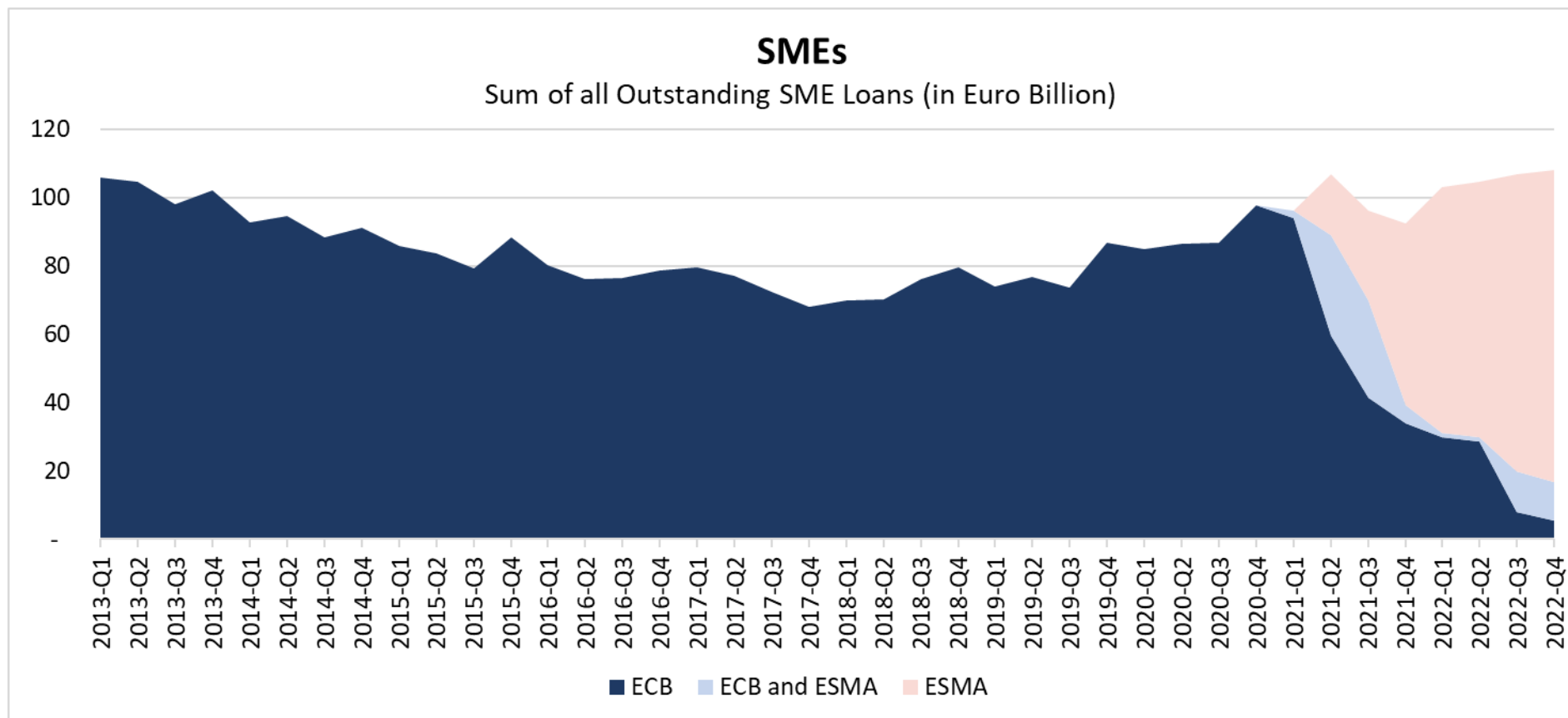
# ECB VS ESMA VS FCA DATA AVAILABILITY (1)



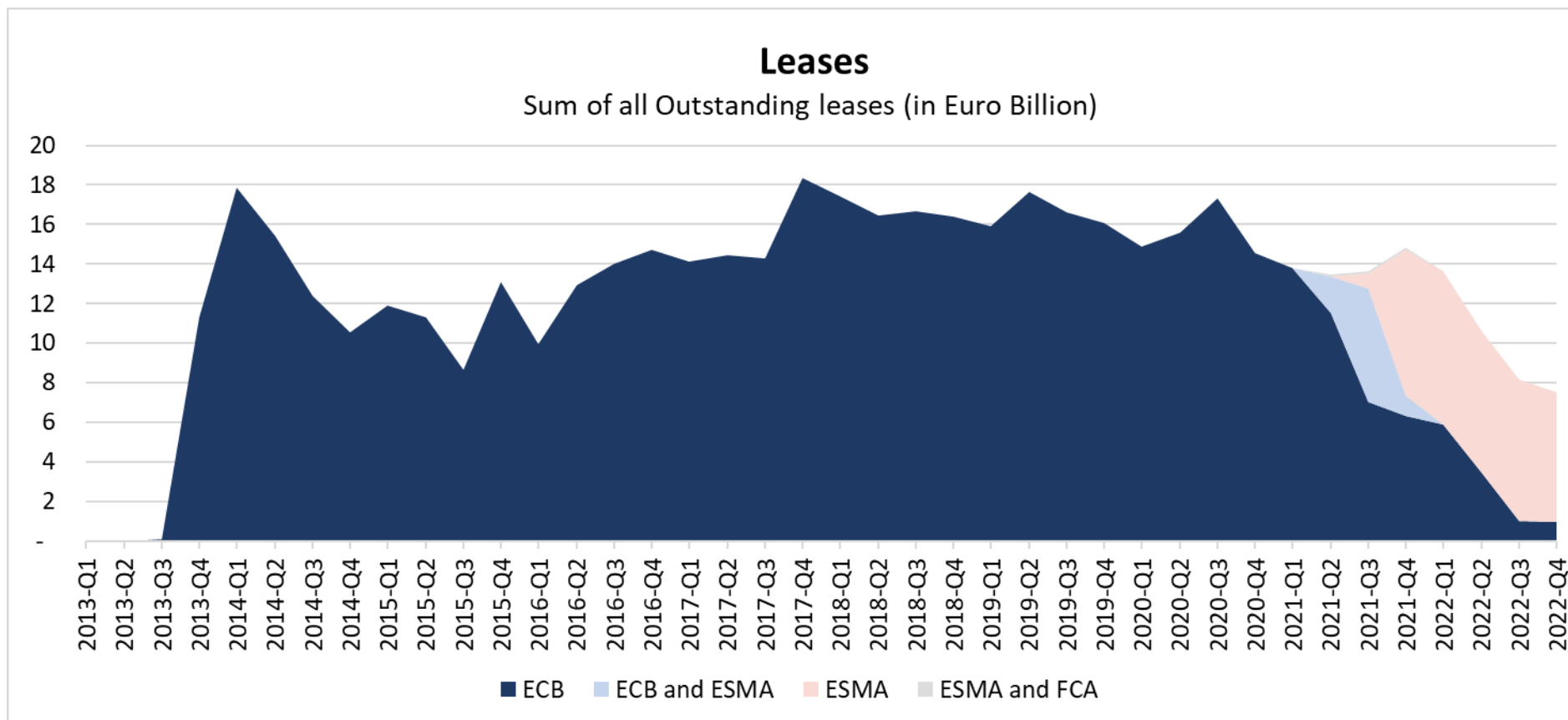
# ECB VS ESMA VS FCA DATA AVAILABILITY (2)



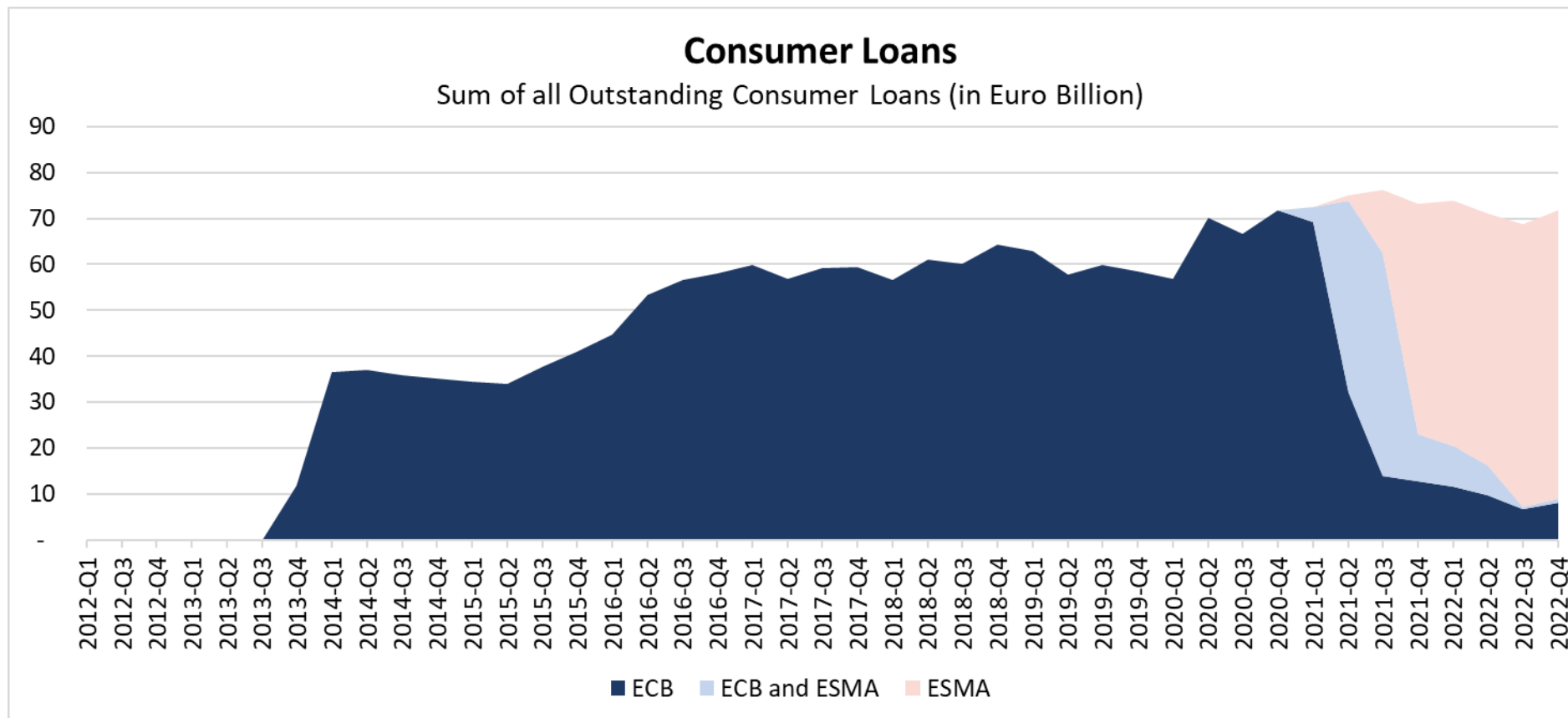
# ECB VS ESMA VS FCA DATA AVAILABILITY (3)



# ECB VS ESMA VS FCA DATA AVAILABILITY (4)

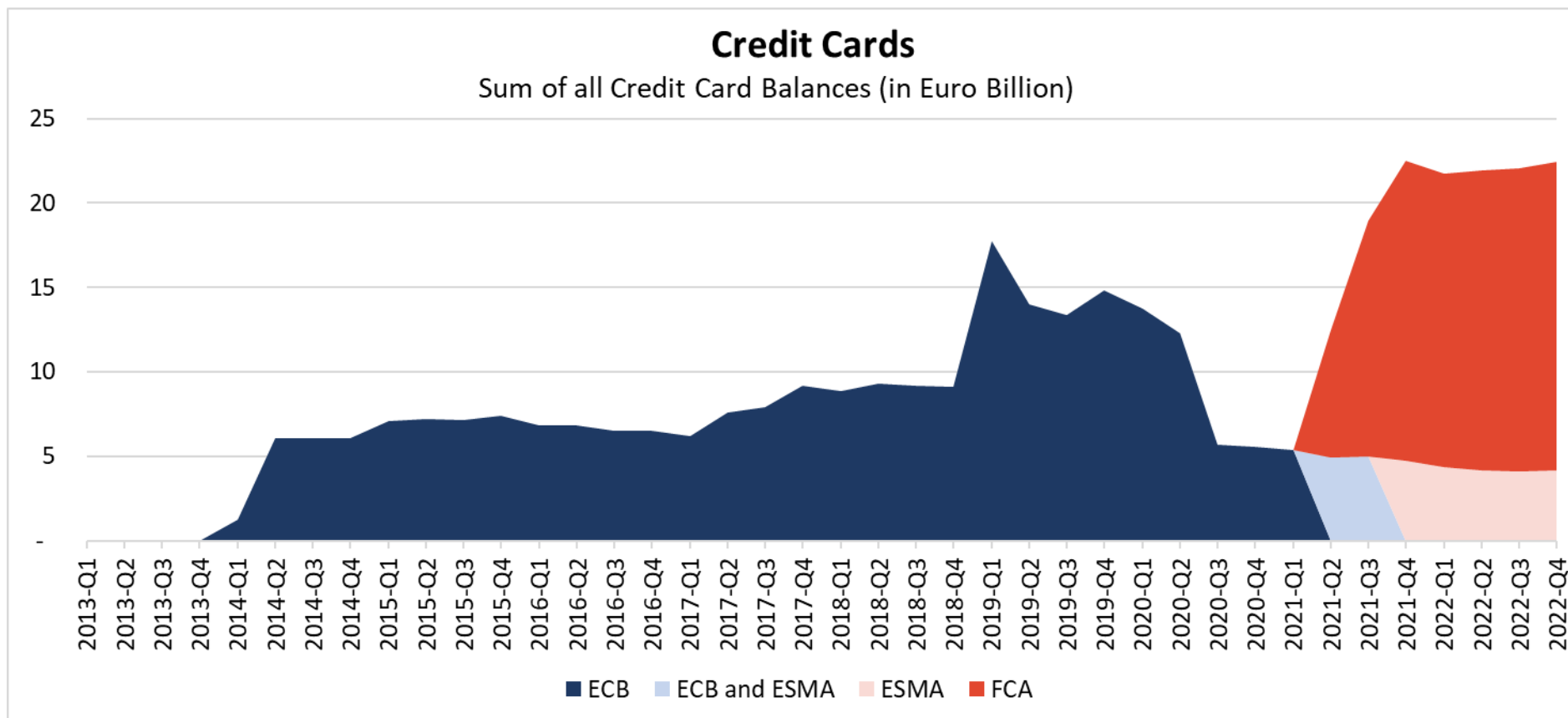


# ECB VS ESMA VS FCA DATA AVAILABILITY (5)





# ECB VS ESMA VS FCA DATA AVAILABILITY (6)

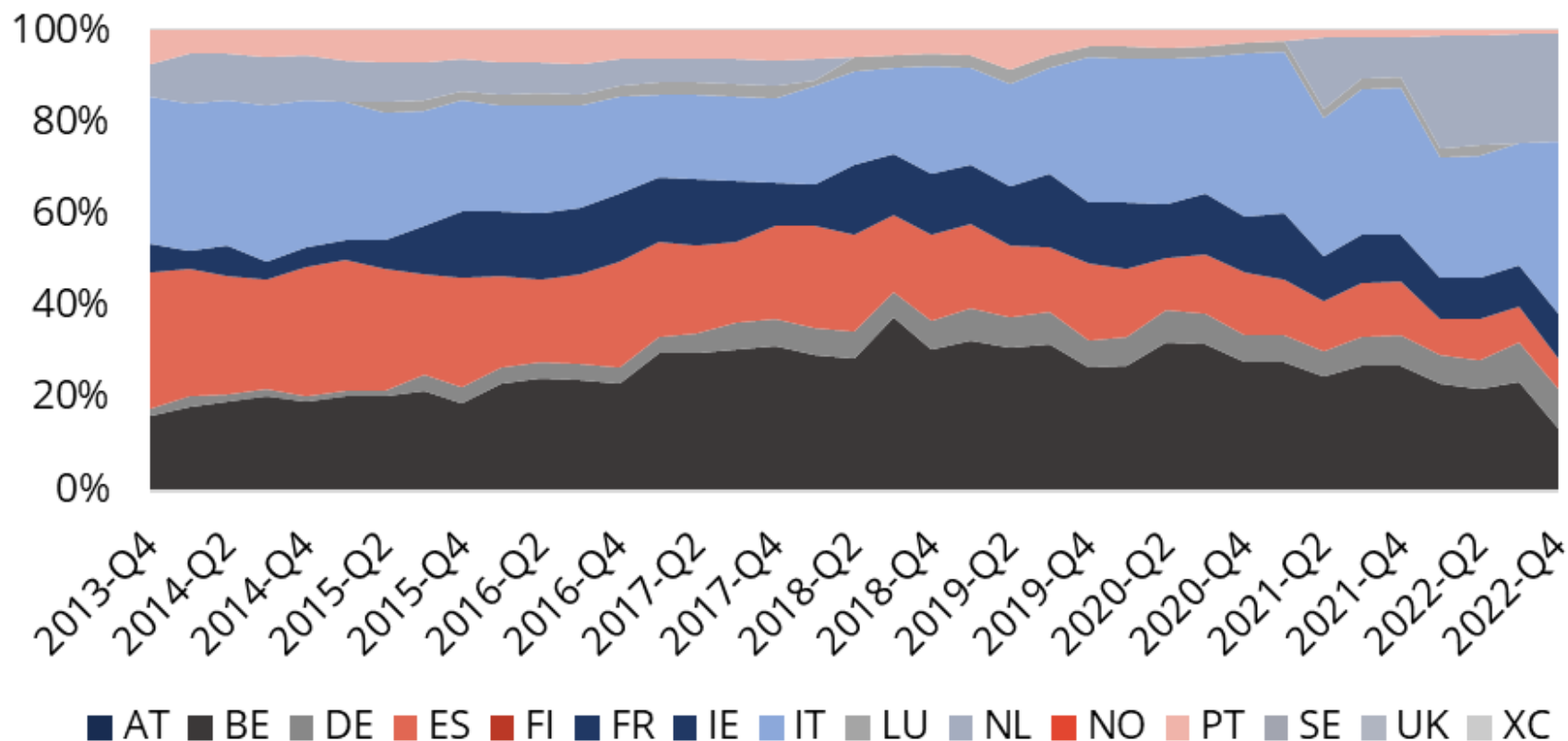


# LOAN PERFORMANCE UPDATE

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# ABS SME DATA AVAILABILITY (Q4 2022)

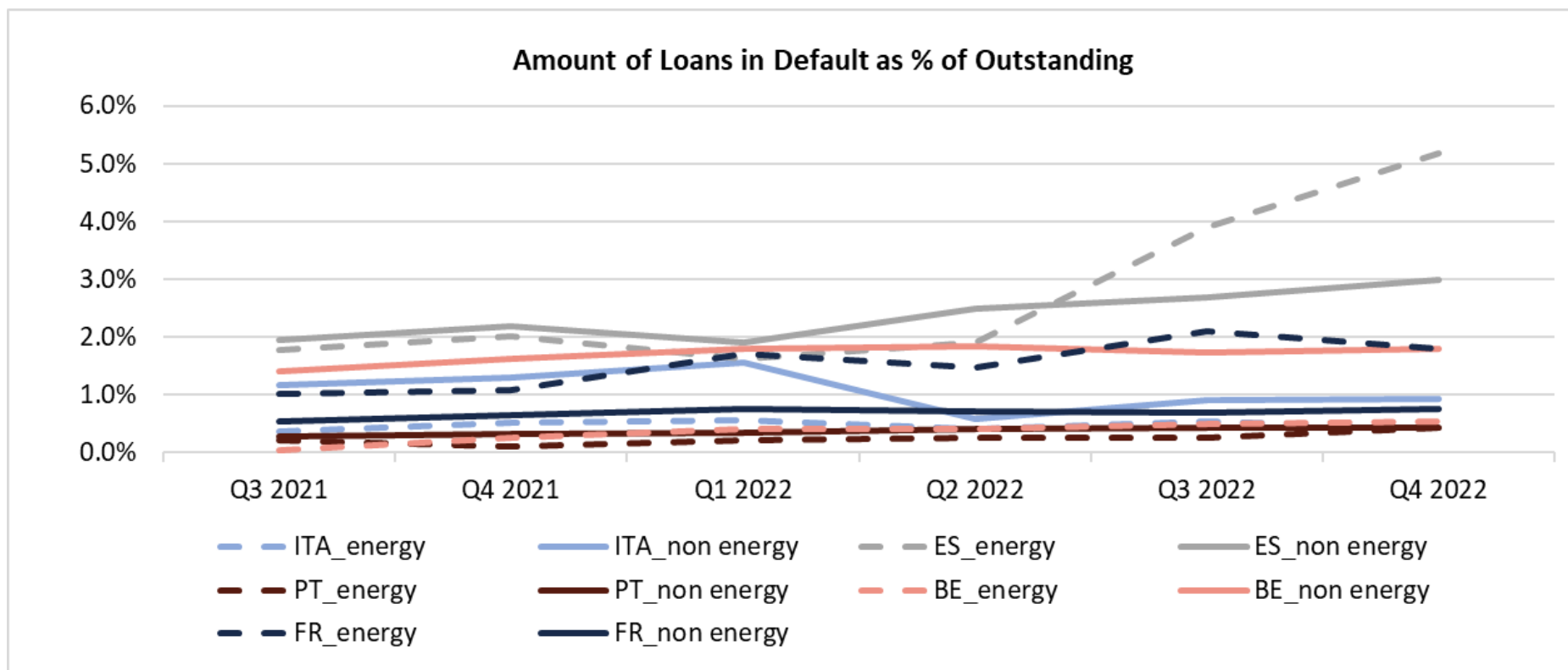
## Outstanding EUR Loan Amount - SME



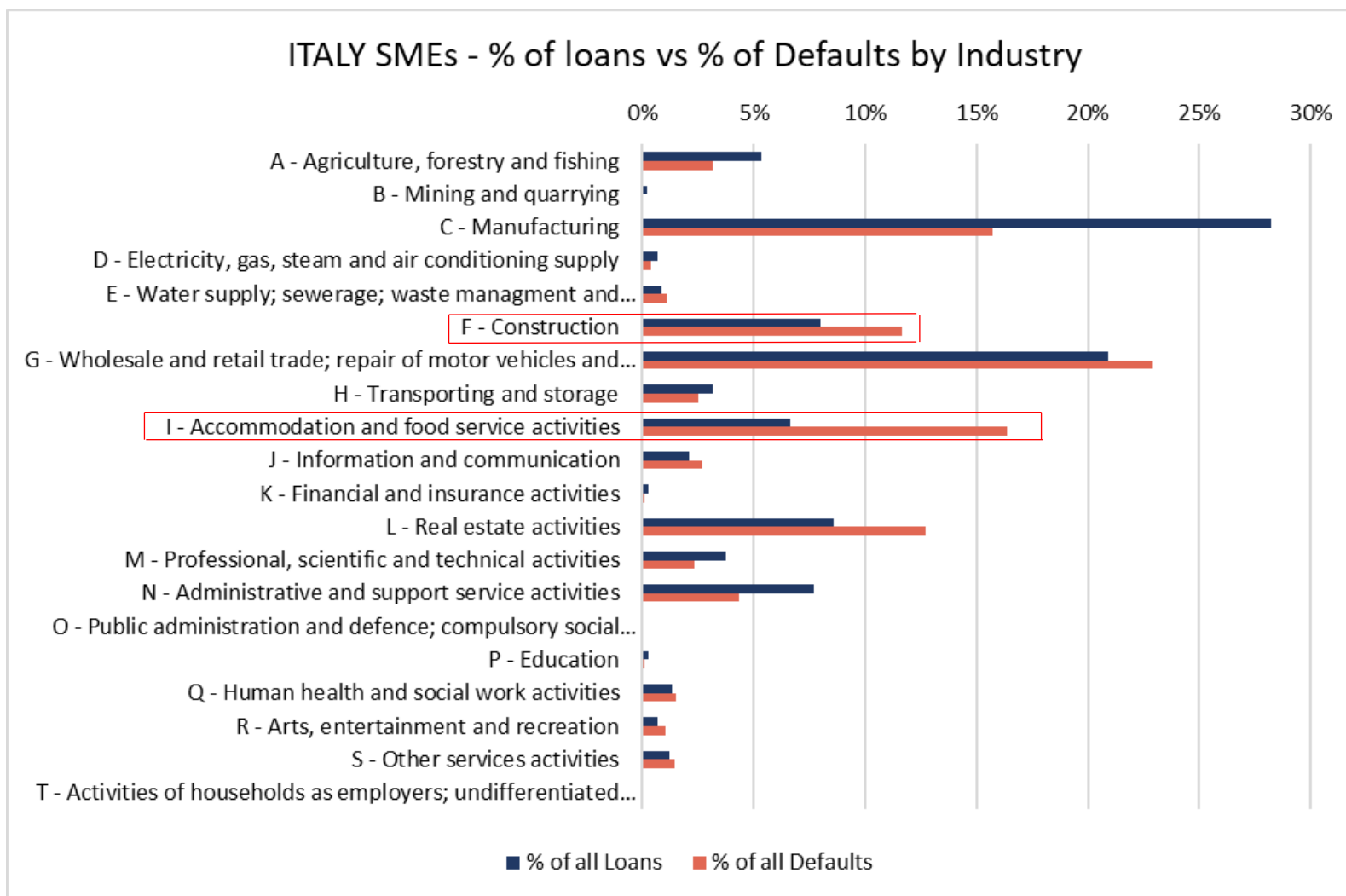
## SME SNAPSHOT: EXPOSURE TO ENERGY-INTENSIVE INDUSTRIES

Country	All SME loans		Of which Loans to Energy Intensive SMEs	
	EUR Billions	nr. Of Loans	% of CBAL	% Nr. of Loans
Italy	38.15	517,263	25.8%	11.1%
Germany	8.29	51,200	22.8%	13.3%
Portugal	0.8	201,109	17.6%	13.8%
Spain	5.3	42,768	14.5%	6.3%
France	8.4	10,962	9.2%	5.9%
Netherlands	25.4	123,133	7.5%	6.2%
Belgium	22.6	7,536	5.2%	4.3%

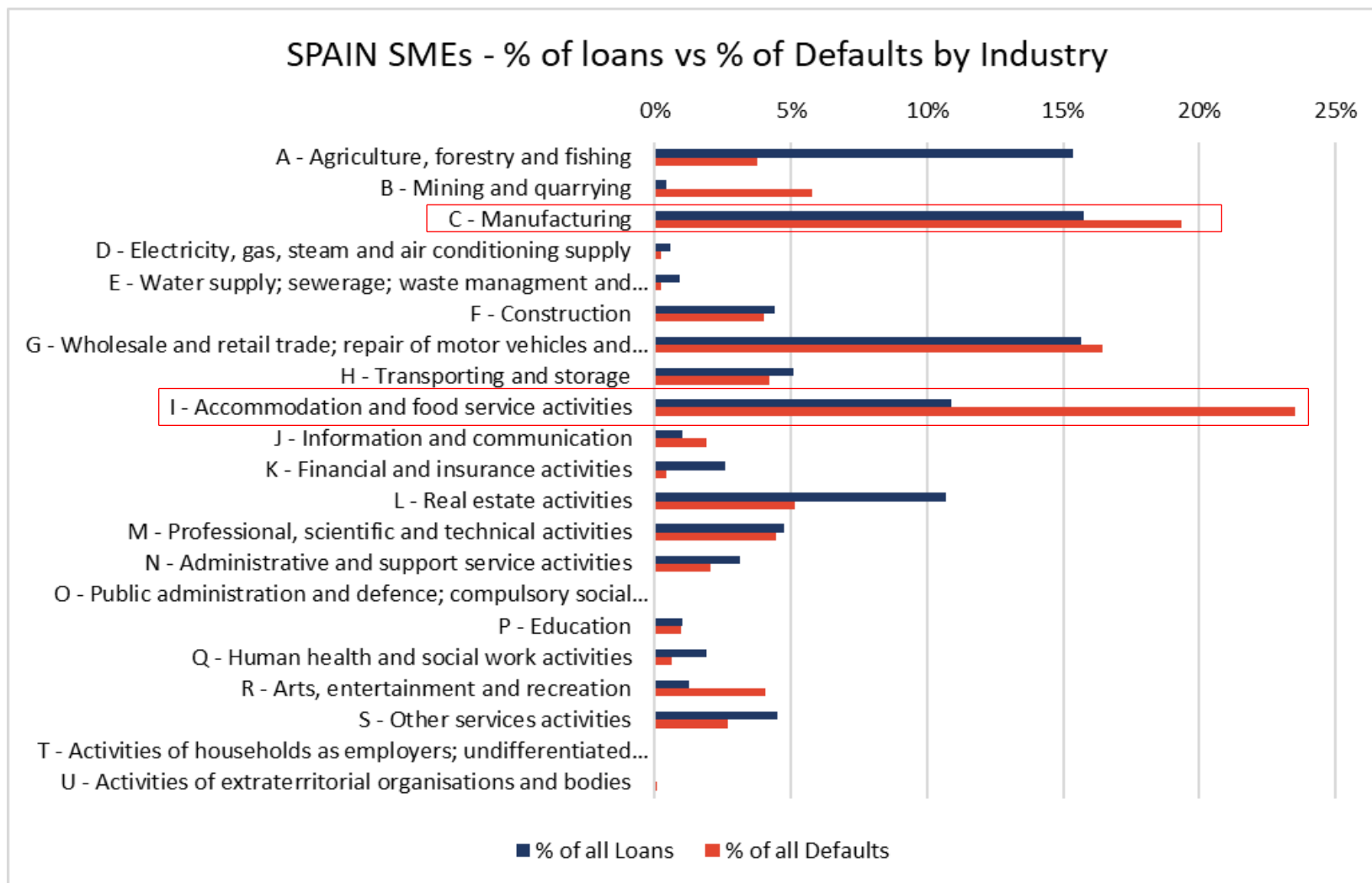
# SME SNAPSHOT: DEFAULT LOAN AMOUNT AS % OF OUTSTANDING



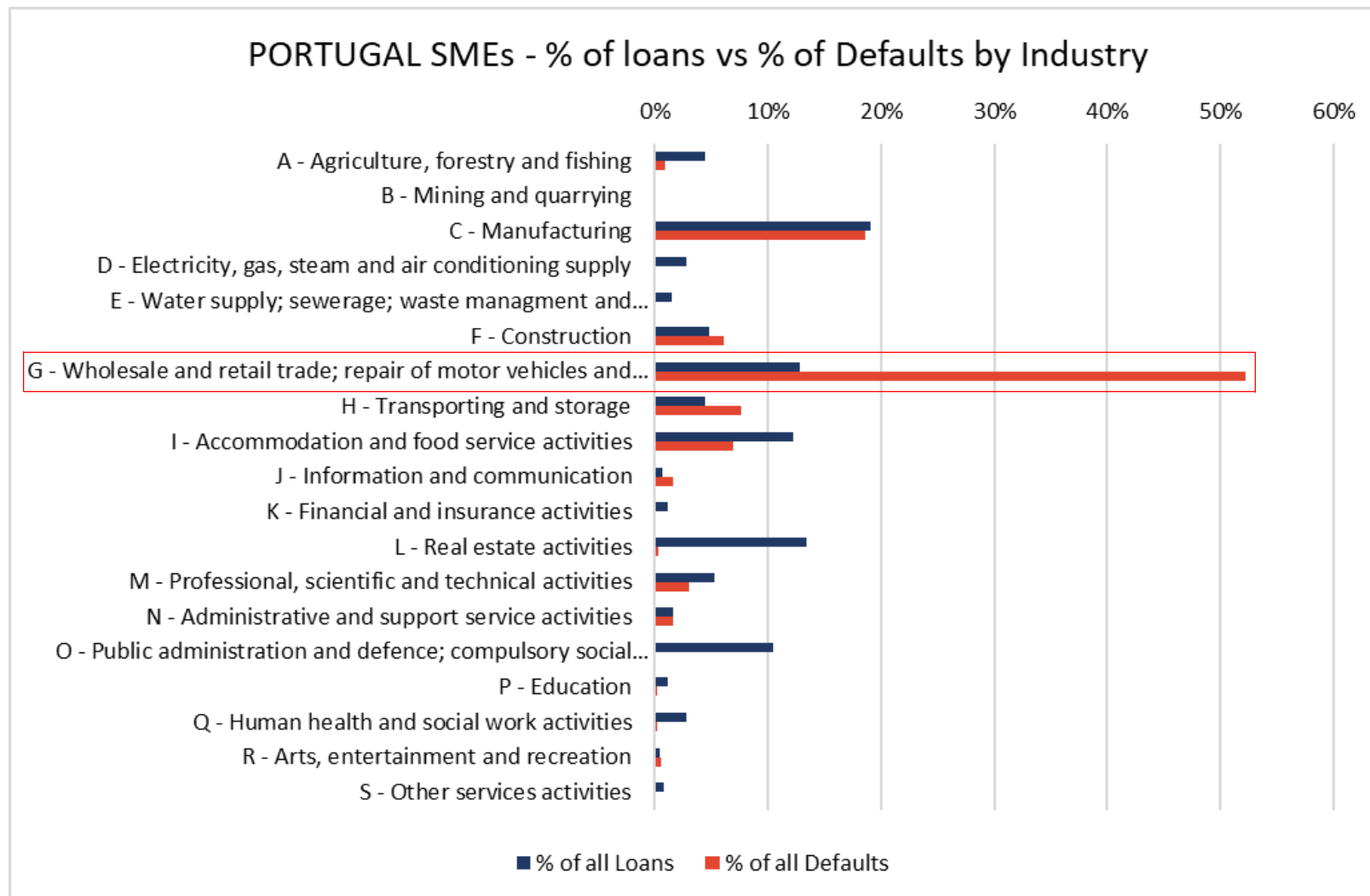
# SME SNAPSHOT AT 2022 Q4 : % OF LOANS VS % OF DEFAULTS



# SME SNAPSHOT AT 2022 Q4 : % OF LOANS VS % OF DEFAULTS

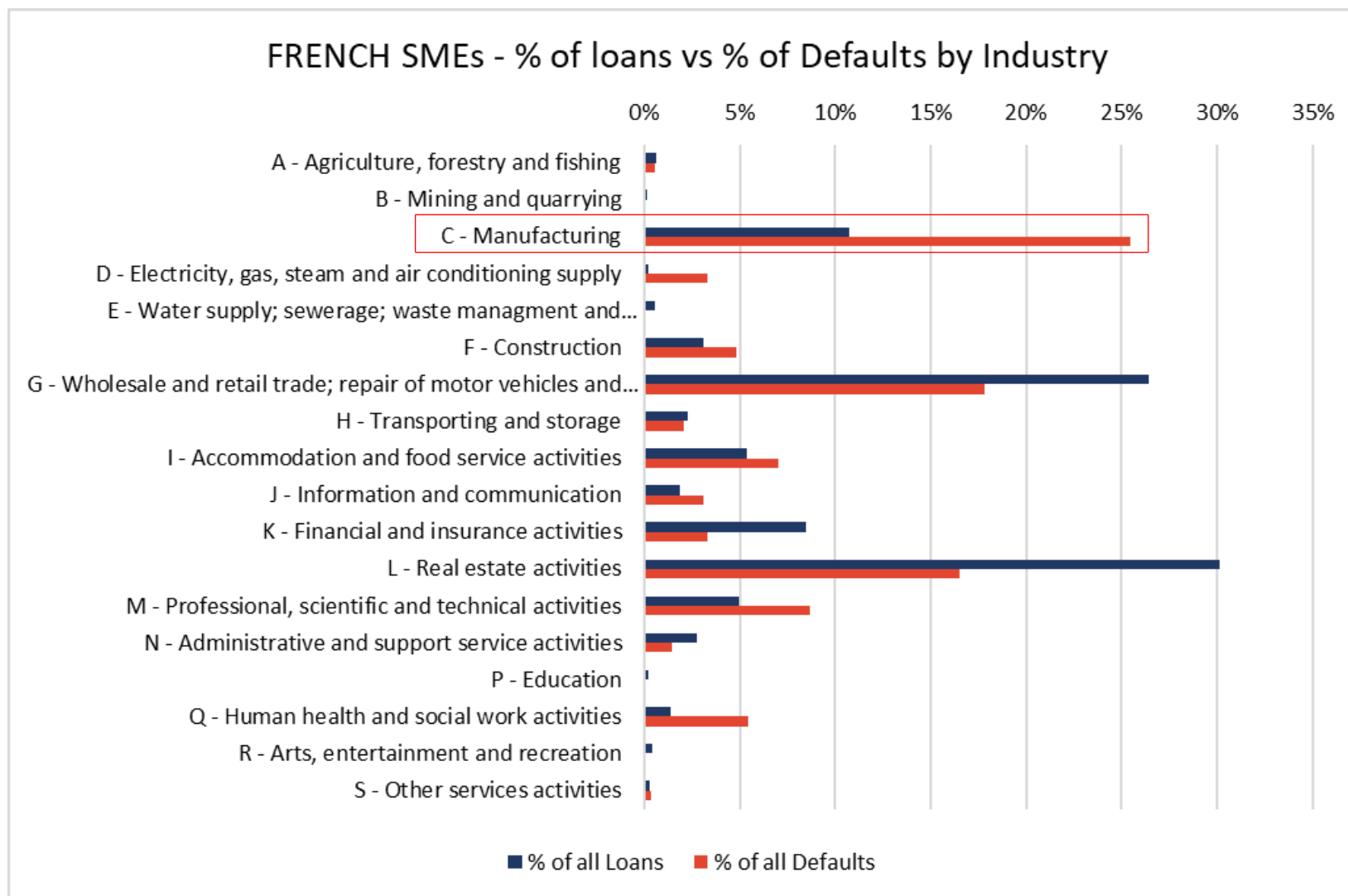


# SME SNAPSHOT AT 2022 Q4 : % OF LOANS VS % OF DEFAULTS

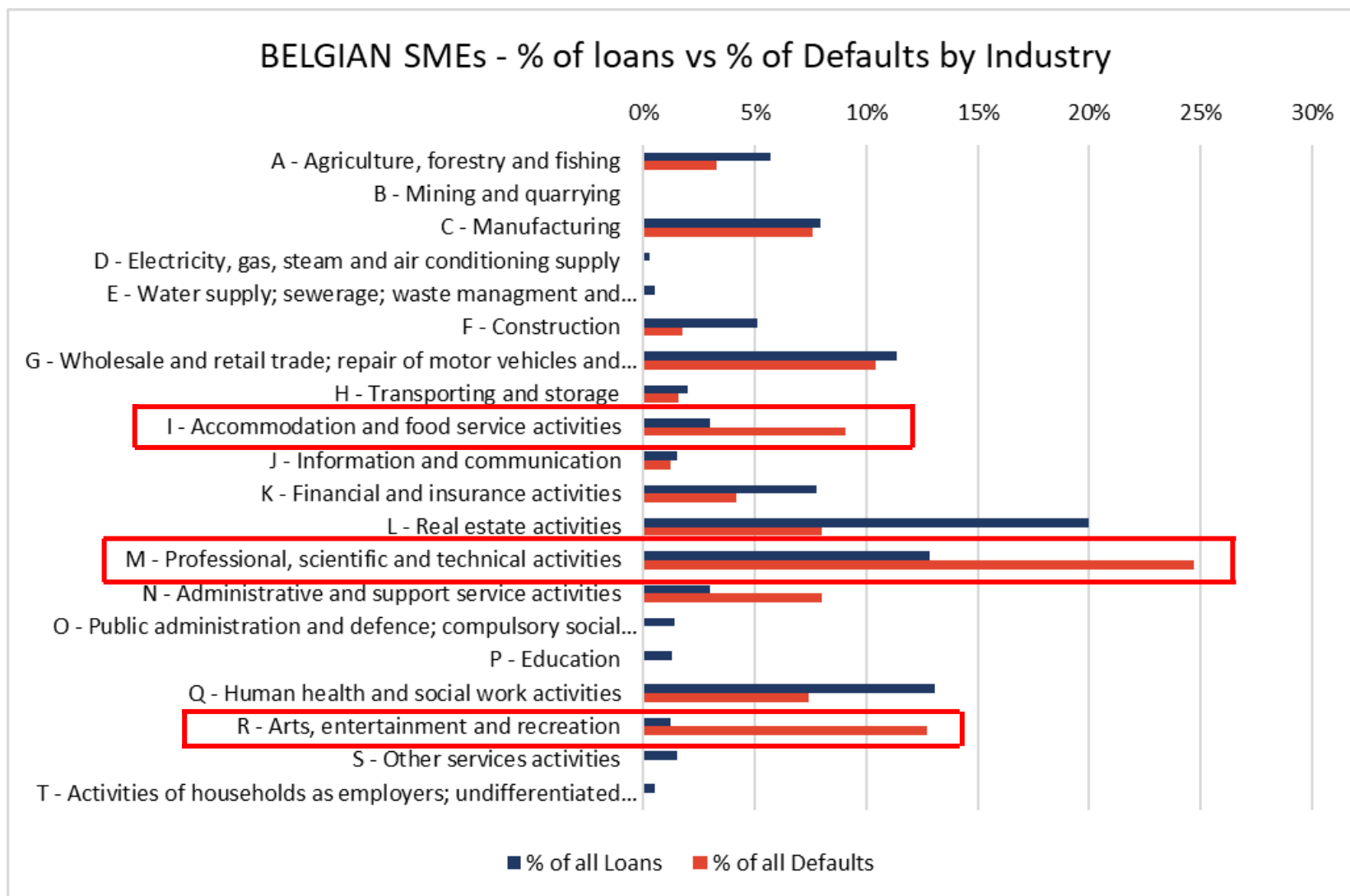




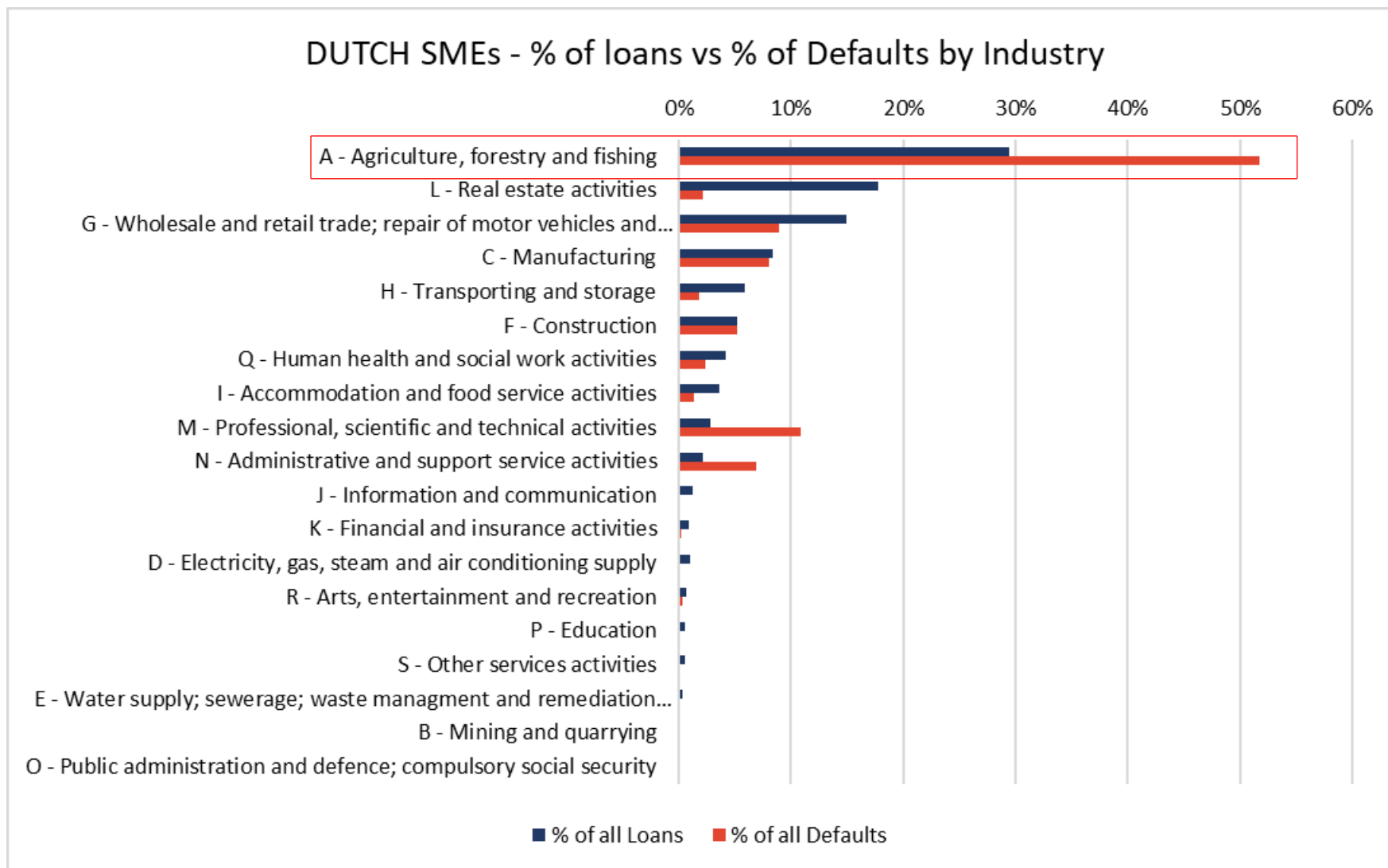
# SME SNAPSHOT AT 2022 Q4 : % OF LOANS VS % OF DEFAULTS



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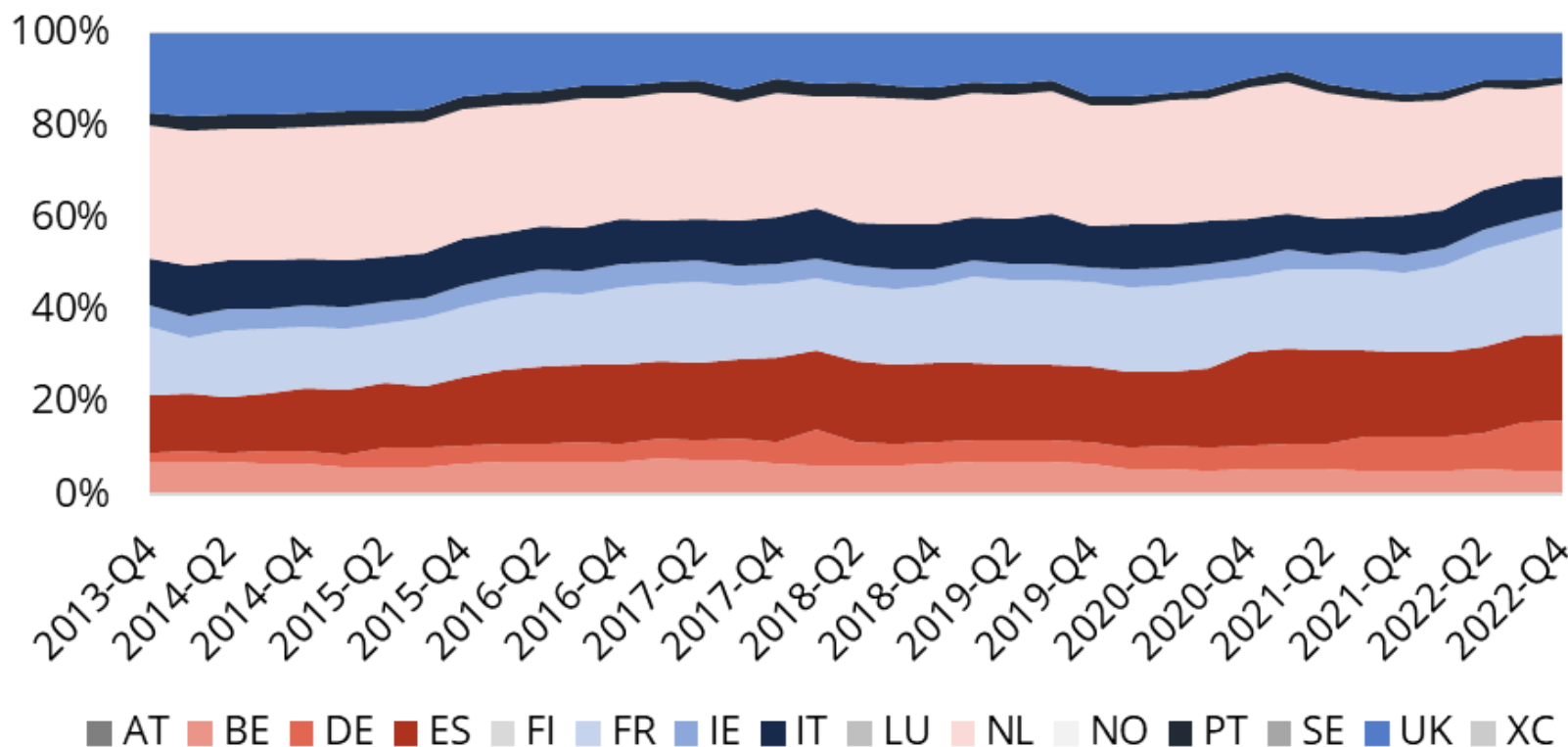
# SME SNAPSHOT AT 2022 Q4 : % OF LOANS VS % OF DEFAULTS



# ESMA VS ECB DATA AVAILABILITY (Q4 2022)

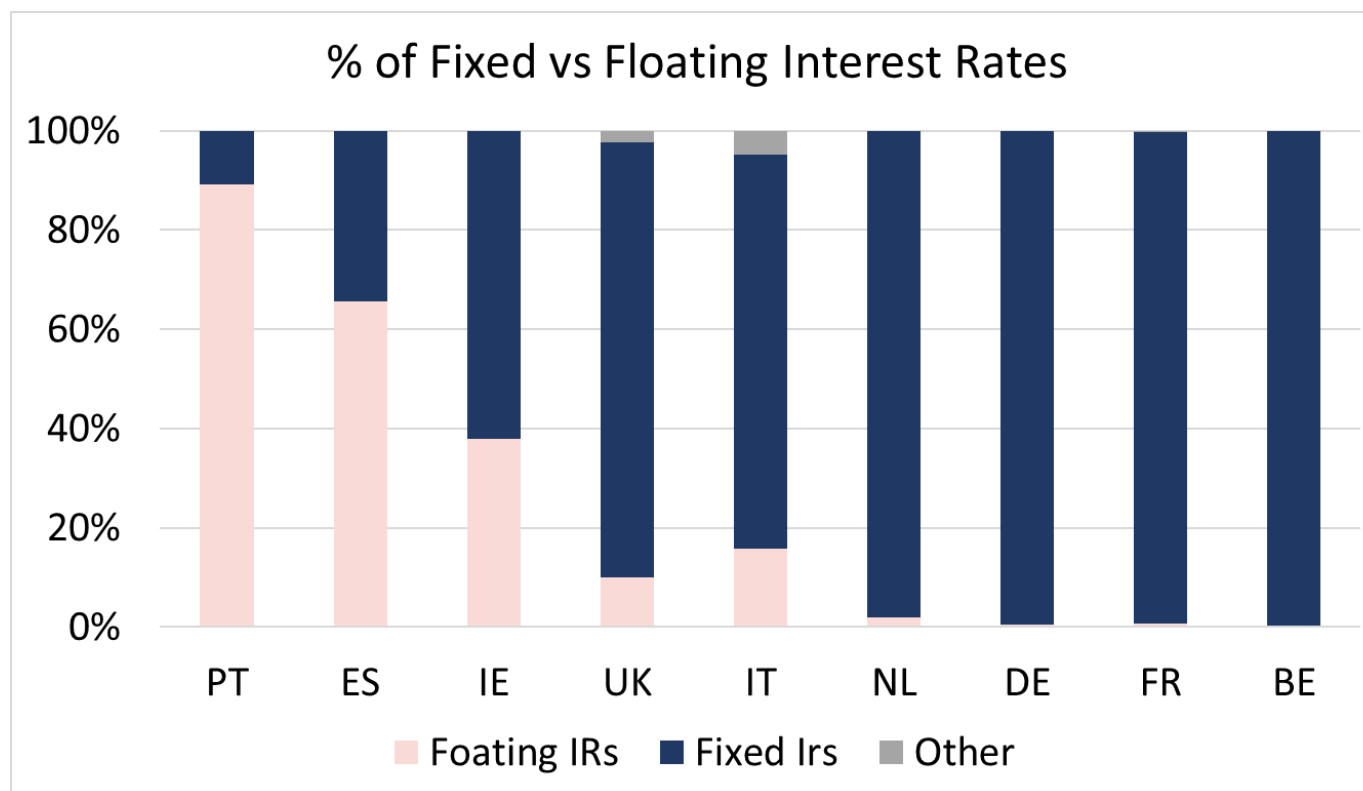
RMBS segment is one of the most representative and diversified

Outstanding EUR Loan Amount - RMB

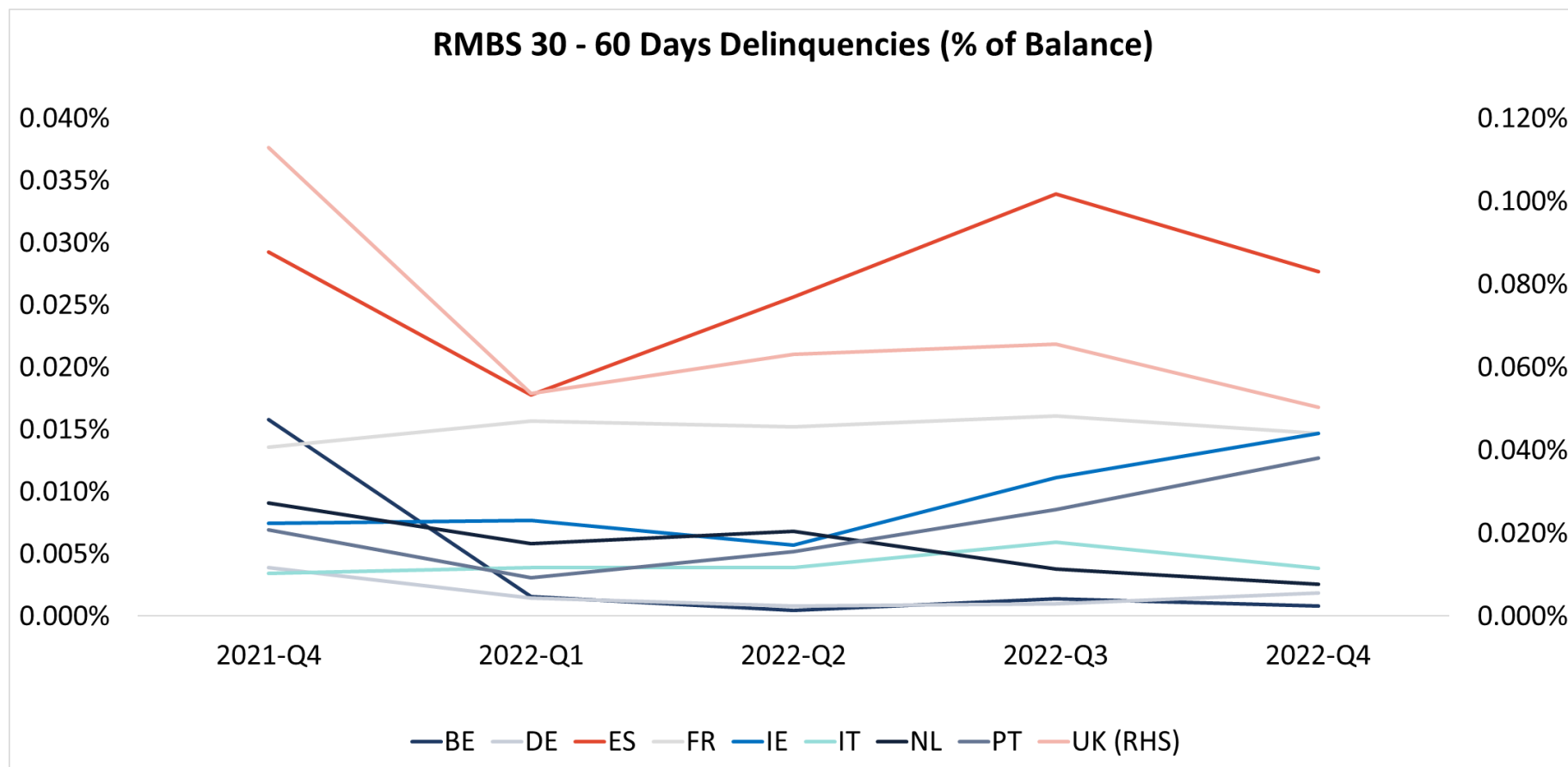


# ESMA VS ECB DATA AVAILABILITY (Q4 2022)

We would expect delinquencies to increase particularly in countries with floating interest rates



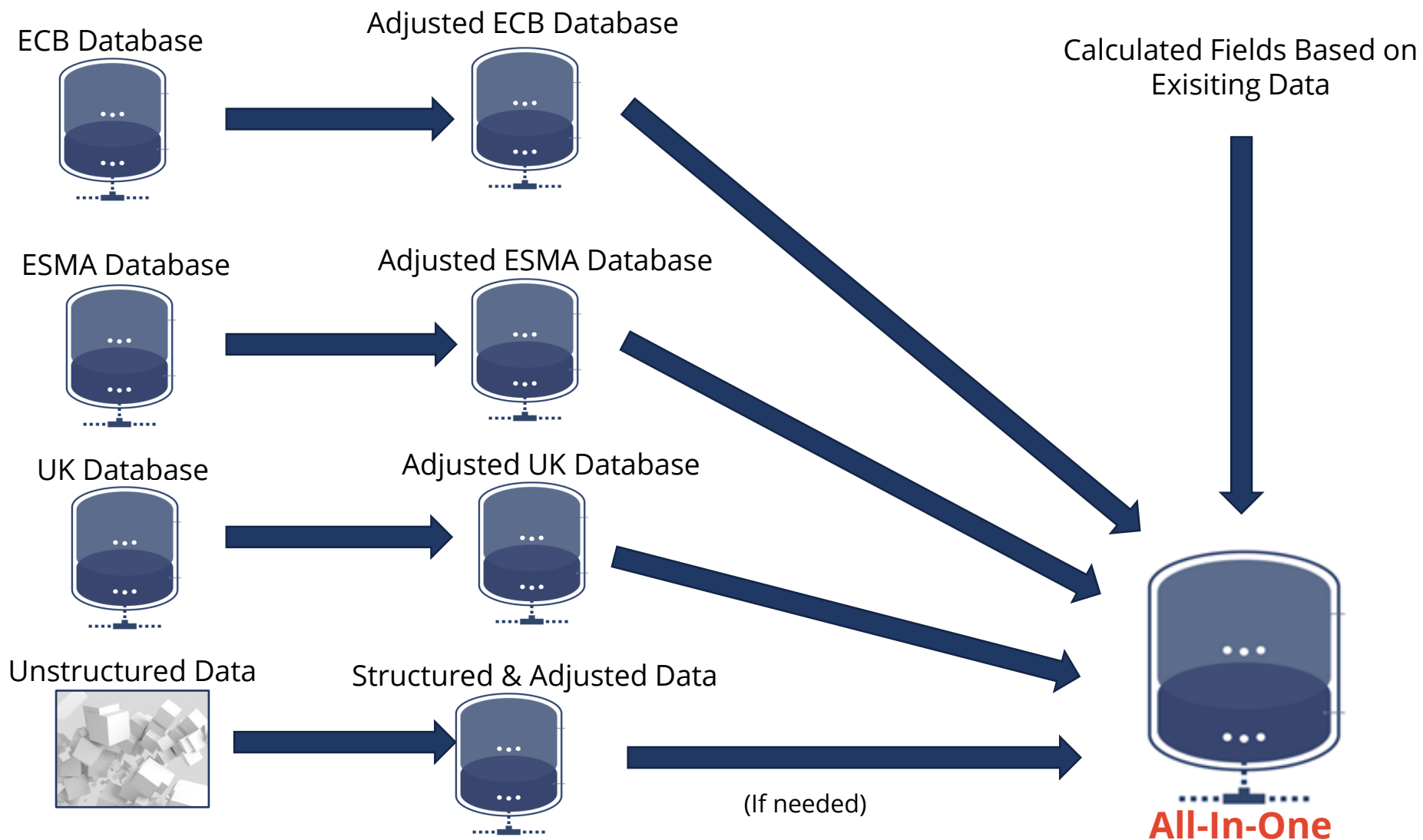
# RMBS SNAPSHOT: EARLY DELINQUENCIES AS % OF OUTSTANDING



# ALL-IN-ONE DATABASE (PROJECT)

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# 5 INGREDIENTS OF THE ALL-IN-ONE DATABASE

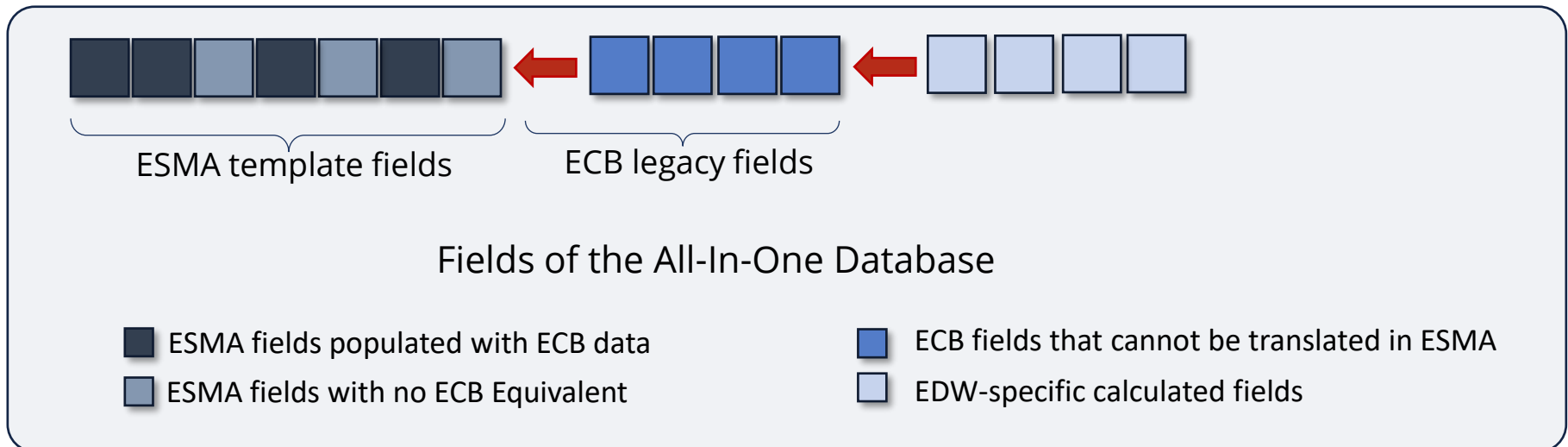




# FIELDS OF THE ALL-IN-ONE DATABASE (WORK IN PROGRESS)

- The all in one database would include
  - a) All the ESMA fields
  - b) The ECB fields with no ESMA field equivalent
  - c) Some calculated fields

## Fields of the All-In-One Database (same logic for all asset classes)

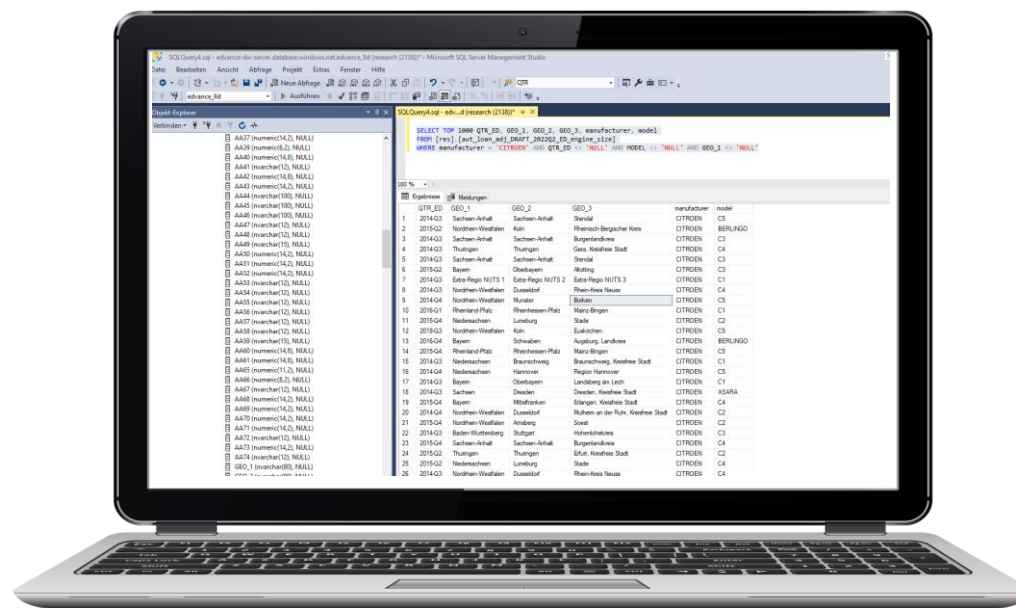
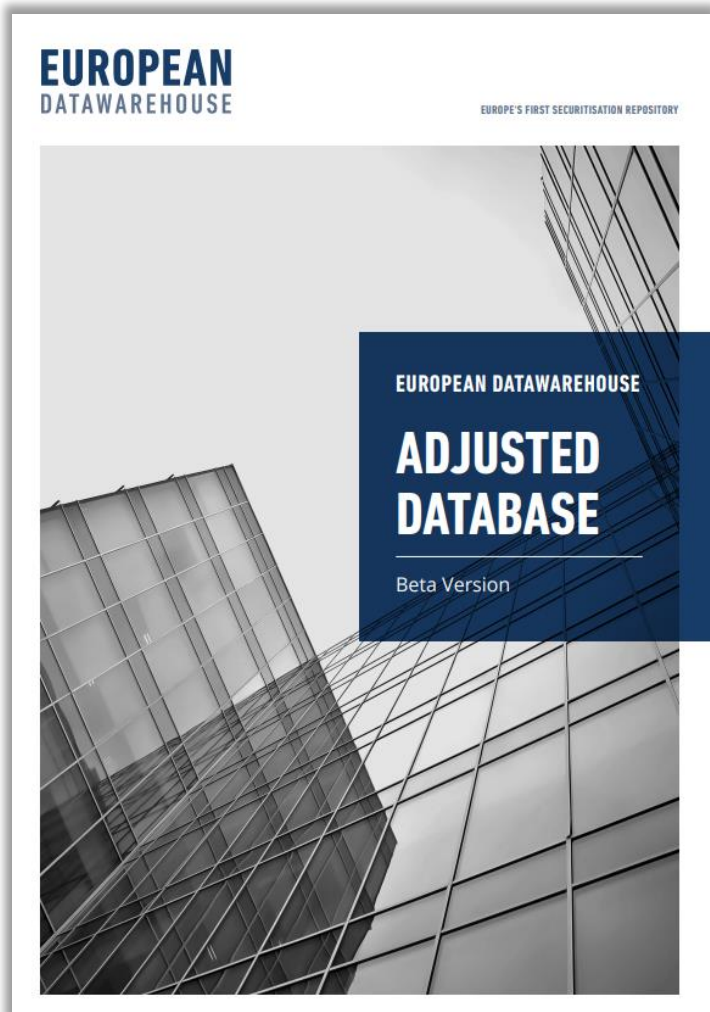


# ADJUSTED DATABASE (ECB DATA ONLY)

LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

# ADJUSTED DATABASE REPORT

Available online: [https://eurowdw.eu/research\\_articles/edw-adjusted-database-beta-report/](https://eurowdw.eu/research_articles/edw-adjusted-database-beta-report/)



## LIST OF CALCULATED FIELDS AS OF MARCH 2023 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
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	No	No	No	No	No
Model	yes	No	No	No	No	No
Fuel_Type	yes	No	No	No	No	No
Year_Model	yes	No	No	No	No	No
Engine_size	yes	No	No	No	No	No

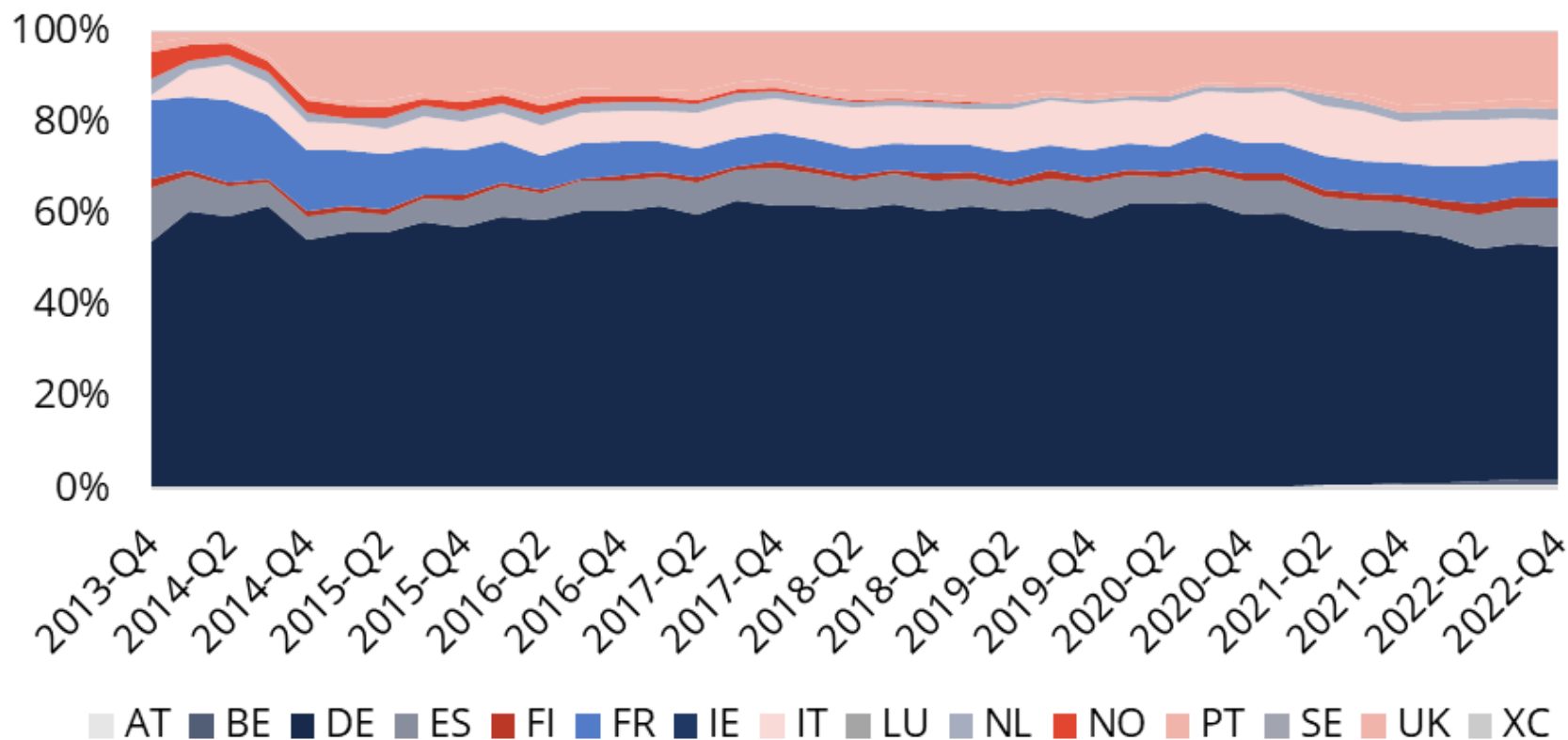
# AUTO MANUFACTURERS/ENGINE SIZE

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# AUTO ABS DATA AVAILABILITY (Q4 2022)

50% of the Auto asset class is concentrated in Germany

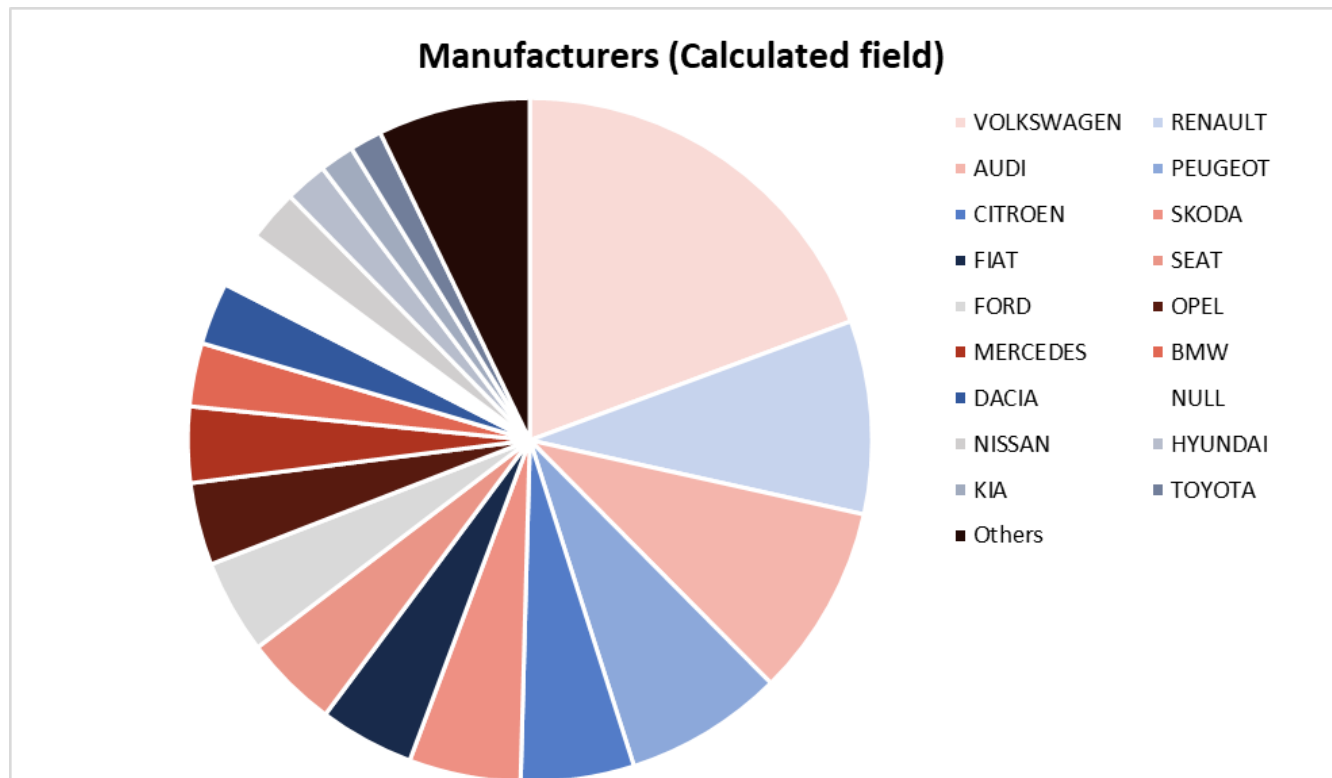
Outstanding EUR Loan Amount - Auto



# MANUFACTURER

Calculating “Manufacturer” from AA44 (manufacturer) and AA45 (car model)

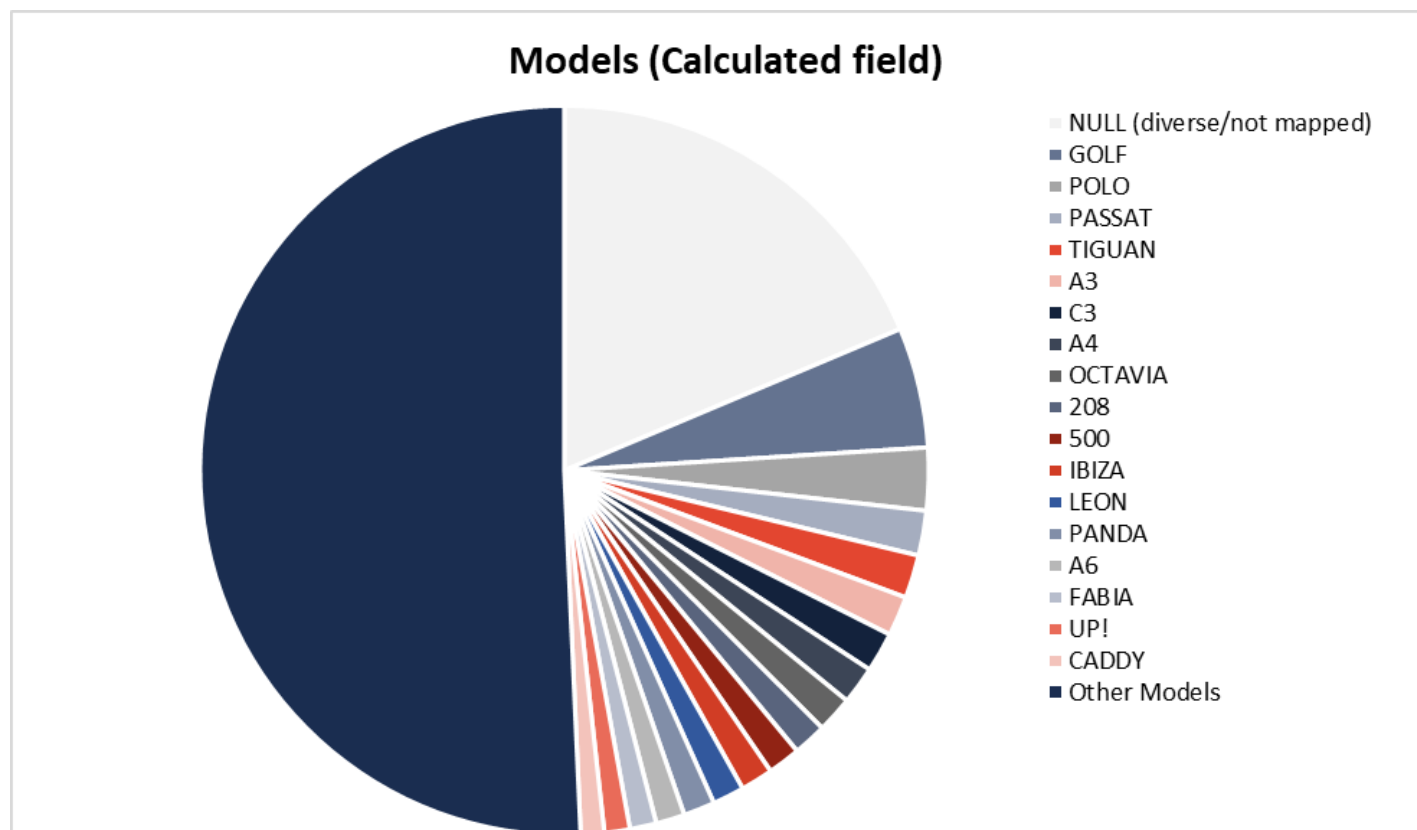
- “Select distinct” on field AA44 = > 110,000 results
- 97% of all observations have a calculated Manufacturer (else NULL)
- We mapped 149 brands from Abarth (sports brand of Fiat) to Zündapp (motorcycles/e-bikes)



# MODEL

## Calculating "Model" from AA44 (manufacturer) and AA45 (car model)

- A clean model name is available for more than 80% of all auto loans
- We have mapped 455 models so far

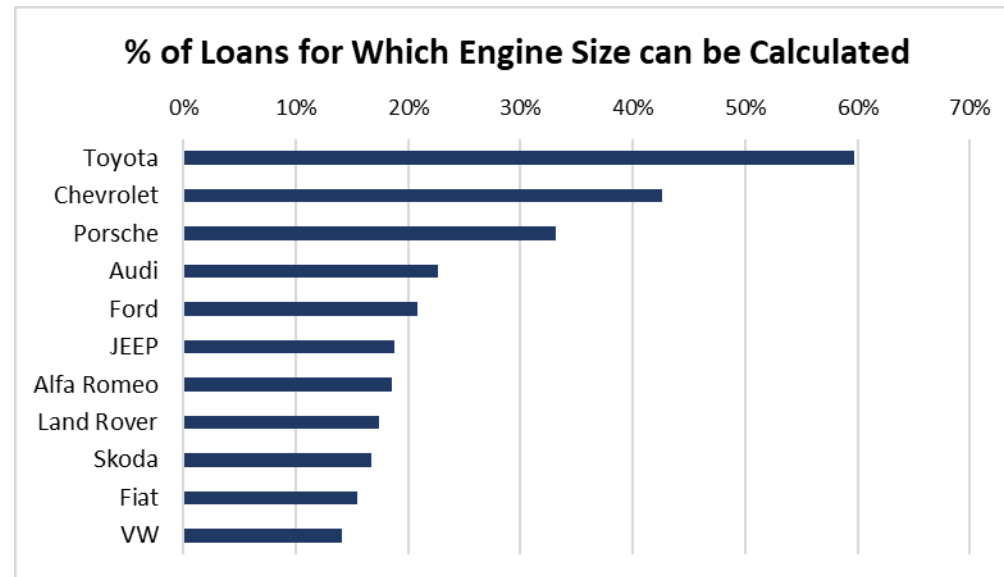




# ENGINE SIZE

## Calculating “Engine Size” from ECB fields AA46 (engine size) and AA45 (car model)

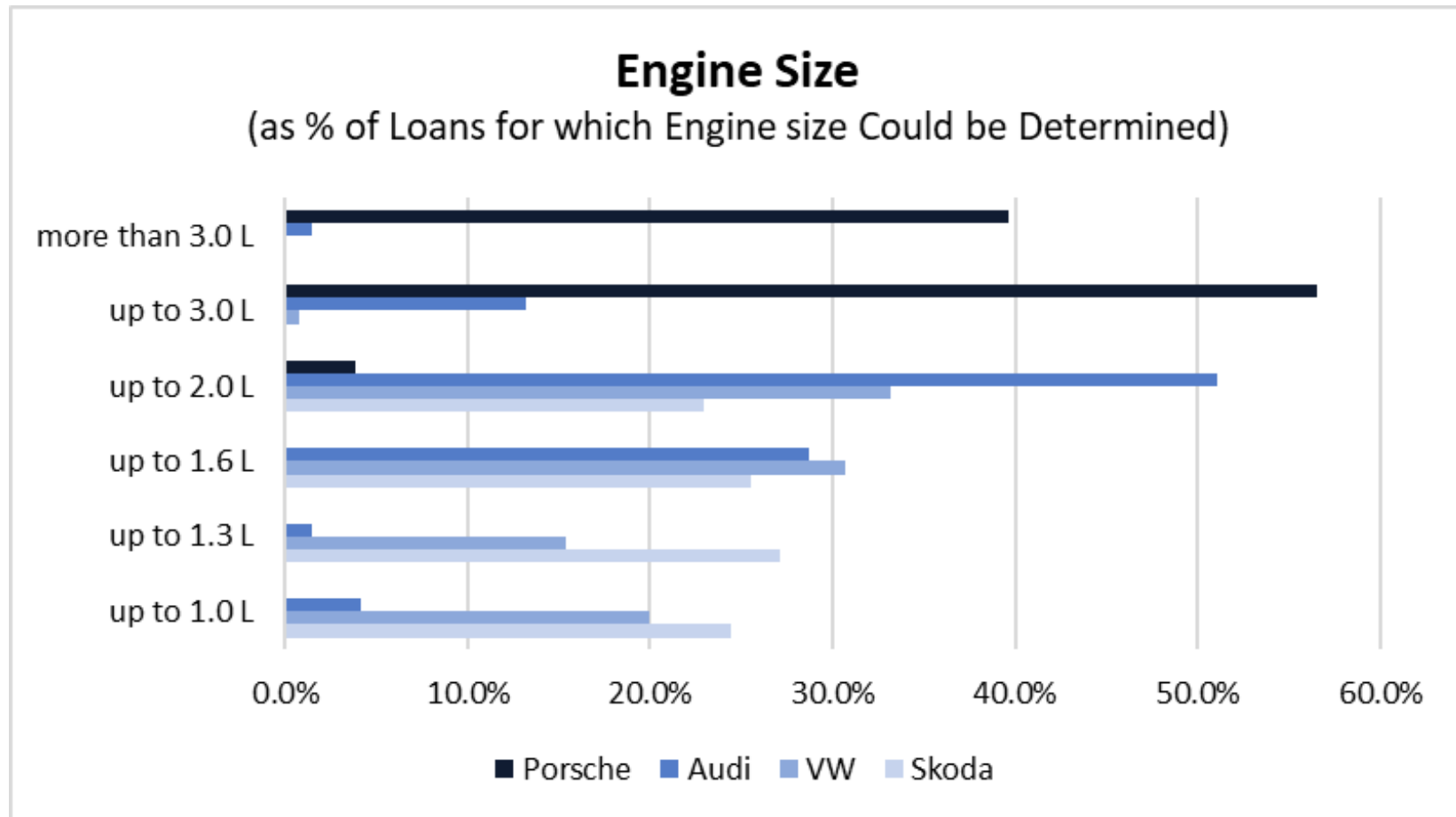
- AA46 Engine size is an optional field, which is not consistently populated
  - Usually not populated, and when populated, not populated consistently with a directly usable content
  - Typical entries for a 2 liter engines include: 1984000; 1984 ; 2; 1.984; 2,0 L; 2.0 or a model name including engine size (e.g GOLF 2.0 TSI)
- AA45 (car model) can also contain engine related clues as part of the name of the vehicle
  - AYGO Cool 1,0 5-Türer 5-Gang; MITO TURISMO 1.4 16V ; SPORT 4.4 SDV8
- In some cases (Mercedes, BMW, Lexus, Volvo...), exact model + car vintage can be combined to map engine size; for some other brands, a HP output is provided instead



## ENGINE SIZE (2)

### Example for Volkswagen AG

- Engine size as % of cases where engine size could be calculated



# LOAN IDENTIFIERS

LUDOVIC THEBAULT, EUROPEAN DATAWAREHOUSE

# LOAN IDENTIFIERS MATTER

- Loan/borrower/property identifiers make it possible to track loans overtime for a given deal (EDCODE)
  - Stable loan and borrower IDs are essential to calculate cumulative defaults/recoveries/prepayments
  - Loan/borrower ID changes can distort the result
  - And yet, loans can be dropped from submissions once they become inactive
- Flagging loan ID changes is a necessary first step...
  - What % of loans have modified IDs and when? What loans have ID changes? Do such changes affect only delinquent/restructured loans?
  - Is there a way to repair the time series? Is there a logic to the ID changes? Can a substitute ID can be used?

# LOAN AND BORROWER ID REPORTING REQUIREMENTS

**ECB templates** make a loan ID change is possible if...

AR3 definition: "Unique identifier (ID) for each loan. **The loan ID should If the original loan ID cannot be maintained in this field enter the original ID followed by the new ID, comma delimited not change through the life of the transaction.** (e.g. further advances / second liens are shown as separate entries). Refer to Taxonomy for multiple loan definitions."

**ESMA templates** explicitly require static IDs for loans and borrowers

- Thus the definition for RREL 2 (Loan ID, RMBS 'Original Underlying Exposure Identifier')

*'Unique underlying exposure identifier. The identifier must be different from any external identification number, to ensure anonymity of the obligor. **The reporting entity must not amend this unique identifier.**'*

	AUT		CMR		CRE		LES		RMB		SME	
	Loan	Borrower	Loan	Borrower	Loan	Borrower	Loan	Borrower	Loan	Borrower	Loan	Borrower
Static	AUTL2	AUTL4	CMRL2	CMRL4	CCDL2	CCDL4	LESL2	LESL4	RREL2	RREL4	CRPL2	CRPL4
Non Static	AUTL3	AUTL5	CMRL3	CMRL5	CCDL3	CCDL5	LESL3	LESL5	RREL3	RREL5	CRPL3	CRPL5

# FLAGGING LOAN / BORROWER ID CHANGES

## A measure of loan ID stability

- Check if all the loan IDs reported at T+1 were already reported at T 0.
  - If yes, the score is 100%, meaning: 100% of the loans at T + 1 already had a reported loan ID at T 0.
  - If the score is 0%, it means that none of the loan IDs reported at T + 1 were already reported at T 0.
  - 99% means that 99% of the loans reported at T + 1 had a loan ID reported at T 0...
  - A 0% score is possible if all the loan IDs were changed even while respecting the ECB taxonomy
  - A 99 % score looks “almost perfect”, but what if the 1% of loan ID s that changed were the loans in arrears?
  - For a replenishing/revolving deal, the ratio would not be 100% during the revolving period
- ID change tracking table
  - The ID change tracking table can help to see where the loan IDs are stable...
  - Can be done for all IDs in both ECB and ESMA reporting

# FLAGGING LOAN / BORROWER ID CHANGES (ECB TEMPLATE)

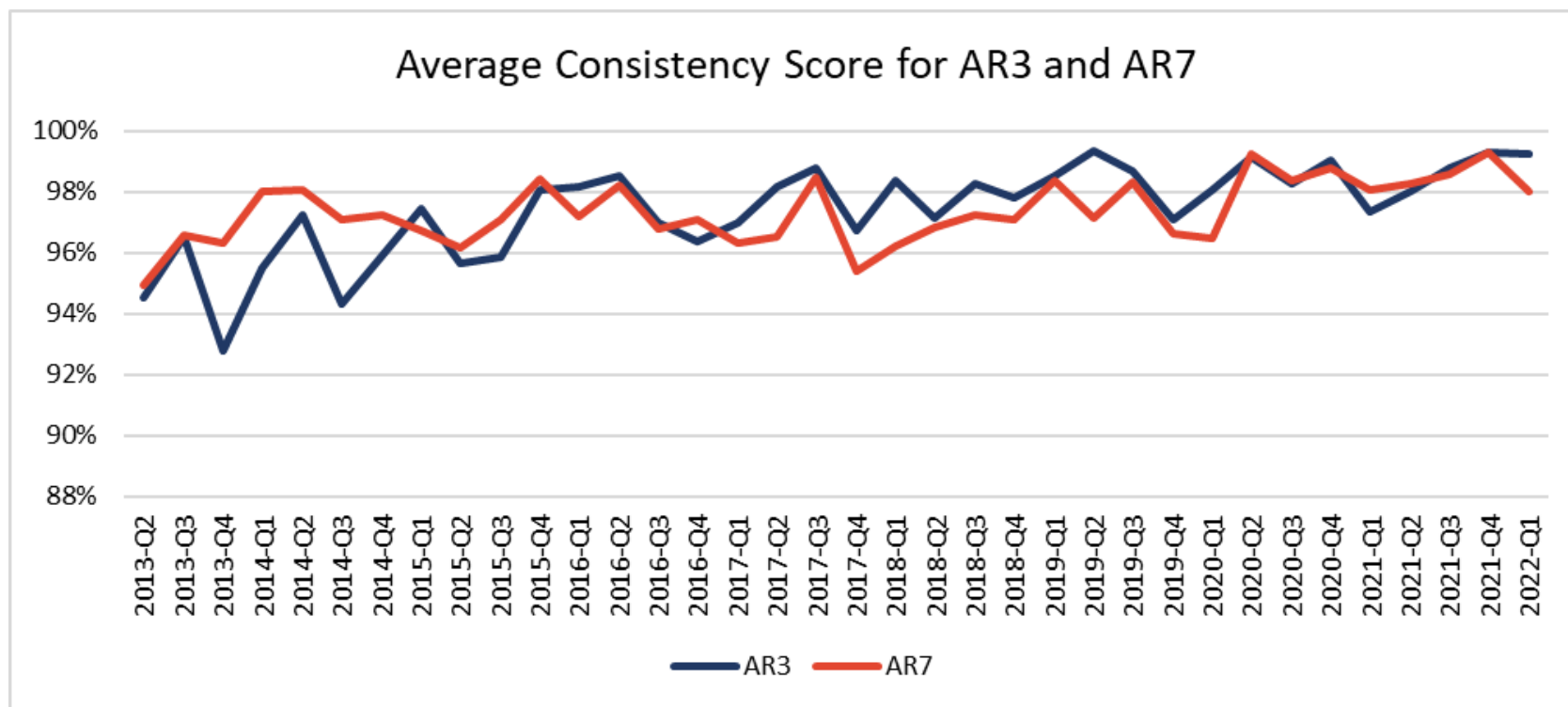
AR3	FirstEntry	AverageF <sub>t</sub>	2013-Q1	2013-Q2	2013-Q3	2013-Q4	2014-Q1	2014-Q2	2014-Q3	2015-Q1	2015-Q2	2015-Q3
RMBSE000556100120088	2014-Q1	97.09%					START	96.98%	98.51%	97.88%	96.85%	98.26%
RMBSES000045100120098	2013-Q1	80.00%	START	100.00%	100.00%	0.00%	100.00%	100.00%				
RMBSES000045100220096	2013-Q1	95.45%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100320078	2013-Q1	97.14%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100420084	2013-Q1	94.34%	START	1.82%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100520057	2013-Q1	96.88%	START	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100620063	2013-Q1	97.06%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100720046	2013-Q1	94.46%	START	100.00%	100.00%	5.78%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100820085	2013-Q1	90.91%	START	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045100920091	2013-Q1	83.33%	START	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%
RMBSES000045101020099	2013-Q1	95.24%	START	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045101120071	2013-Q1	95.24%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045101220079	2013-Q1	84.38%	START	100.00%	90.68%	0.00%	100.00%	100.00%	100.00%	100.00%		
RMBSES000045101320077	2013-Q1	97.14%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045101420083	2013-Q1	75.00%	START	100.00%	100.00%	0.00%	100.00%					
RMBSES000045101520072	2013-Q1	95.24%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000045101620088	2013-Q1	51.70%	START	6.80%	100.00%	0.00%	100.00%					
RMBSES000060100120048	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100220061	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100420026	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100520072	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100620088	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100720029	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
RMBSES000060100820035	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060100920058	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RMBSES000060101020098	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%



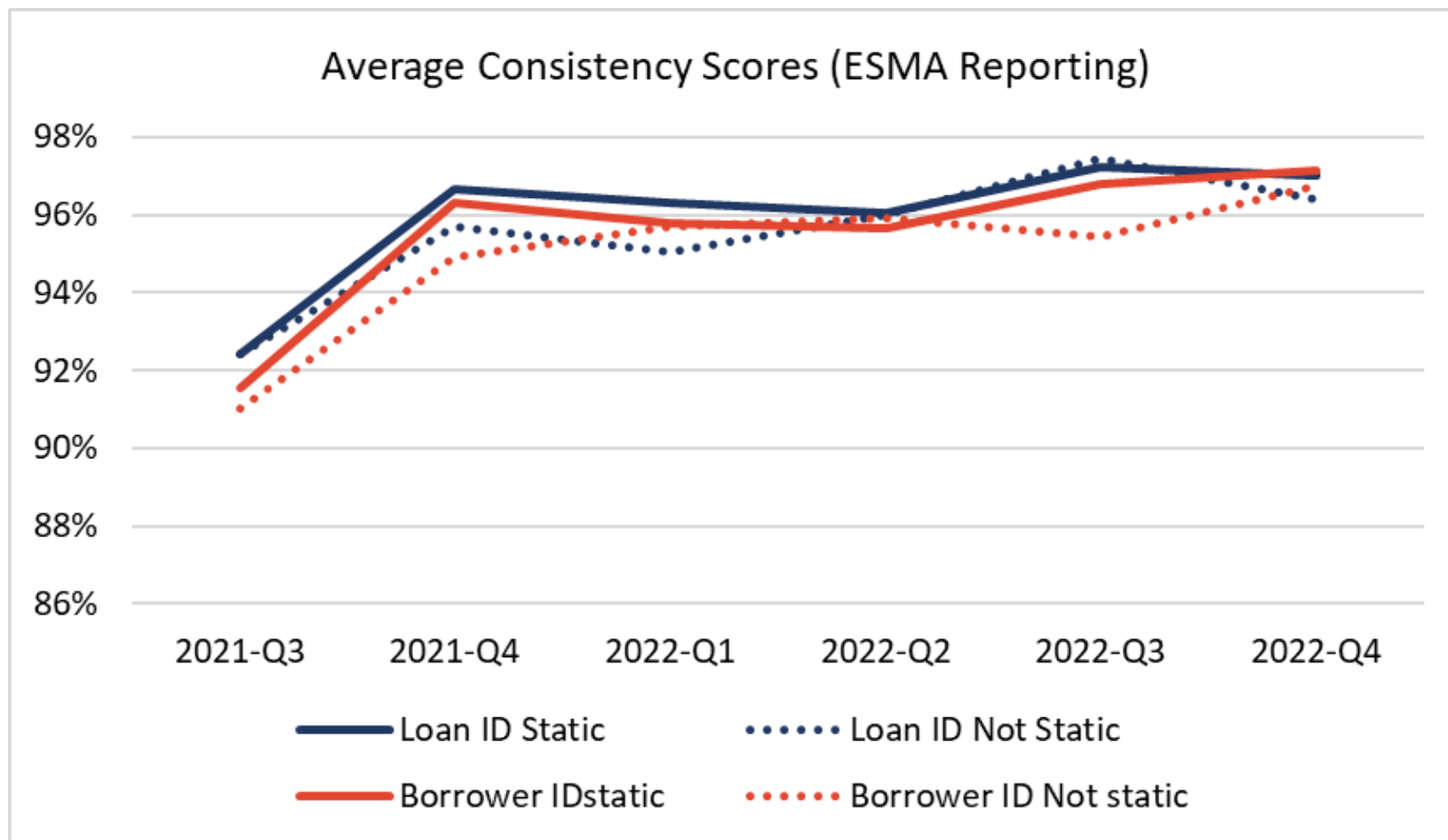


# FLAGGING LOAN / BORROWER ID CHANGES (ECB TEMPLATE)

- Example for RMBS
  - The average scores have somewhat improved overtime
  - The scores for AR3 and AR7 are in a similar range



# FLAGGING LOAN / BORROWER ID CHANGES (ESMA DATA)





## WHAT CAN WE DO? (2) REPAIR LOAN IDS WHEN THERE IS AN INCONSISTENCY

- In this period, a systematic change has affected all the loans from a specific data provider
  - Find out the logic...
  - “Repair past loan IDs”

AR3	FirstEntry	AverageF <sub>i</sub>	2013-Q1	2013-Q2	2013-Q3	2013-Q4	2014-Q1	2014-Q2	2014-Q3	2015-Q1	20
RMBSE000556100120088	2014-Q1	97.09%					START	96.98%	98.51%	97.88%	
RMBSES000045100120098	2013-Q1	80.00%	START	100.00%	100.00%	0.00%	100.00%	100.00%			
RMBSES000045100220096	2013-Q1	95.45%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100320078	2013-Q1	97.14%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100420084	2013-Q1	94.34%	START	1.82%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100520057	2013-Q1	96.88%	START	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	1
RMBSES000045100620063	2013-Q1	97.06%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100720046	2013-Q1	94.46%	START	100.00%	100.00%	5.78%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100820085	2013-Q1	90.91%	START	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045100920091	2013-Q1	83.33%	START	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	1
RMBSES000045101020099	2013-Q1	95.24%	START	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	1
RMBSES000045101120071	2013-Q1	95.24%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045101220079	2013-Q1	84.38%	START	100.00%	90.68%	0.00%	100.00%	100.00%	100.00%	100.00%	
RMBSES000045101320077	2013-Q1	97.14%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045101420083	2013-Q1	75.00%	START	100.00%	100.00%	0.00%	100.00%				
RMBSES000045101520072	2013-Q1	95.24%	START	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000045101620088	2013-Q1	51.70%	START	6.80%	100.00%	0.00%	100.00%				
RMBSES000060100120048	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000060100220061	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	1
RMBSES000060100420026	2013-Q1	100.00%	START	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	1

## WHAT CAN WE DO? (3)

### CALCULATE A “SYNTHETIC” LOAN IDENTIFIER TO TRACK LOANS OVERTIME

- Define a loan by its key characteristics rather than by its loan ID
- It is possible to concatenate several key static fields that define a loan to trace if overtime
  - If borrower ID has not change, include borrower ID, original amount, origination date, maturity etc...
  - Works best for small sample
  - Even static fields can actually be subject to change...
  - Try several combinations
  - Limit this technique to the “switch” period, back populate with the corrected loan ID
- In some cases, only a few IDs change
  - Check if these loans are precisely the ones that are in arrears/default/restructured

# GREEN AUTO SECURITISATION

USMAN JAMIL, EUROPEAN DATAWAREHOUSE

# GREEN AUTO SECURITISATION (GAS) PROJECT

Under the Climate Protection and Finance (KlimFi) funding initiative by the German Ministry for Education



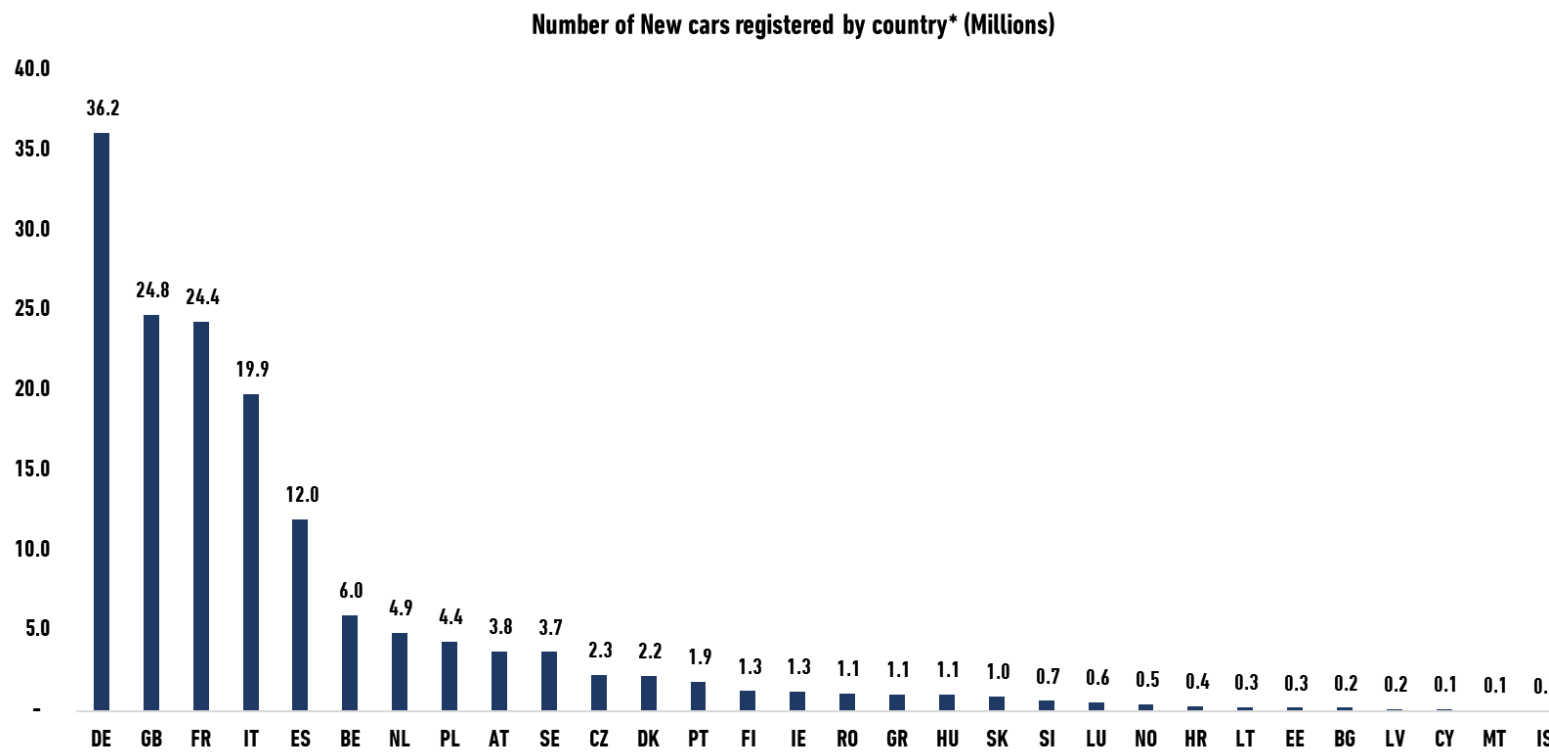
- SAFE\* and EDW have been awarded a grant for the 3-year project ending in September 2025
- SAFE will perform research on ways to incentivize purchases of low-emission vehicles through bank lending
- EDW will support SAFE with data by:
  - Adjusting/Standardising Loan Level Data
  - Requesting and collecting additional information on car characteristics from Auto ABS issuers like:
    - CO2 Emissions
    - Car Weight
    - Fuel Type
    - Engine Size
  - Gathering relevant data from other sources like EEA

*\*Leibniz Institute for Financial Research SAFE*

# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

The EEA Database collects data on CO2 emissions of all new registered vehicles

- Also includes car manufacturer, model, weight, fuel type, engine size
- 156M cars for the years 2010-2021
- Covers 30 countries



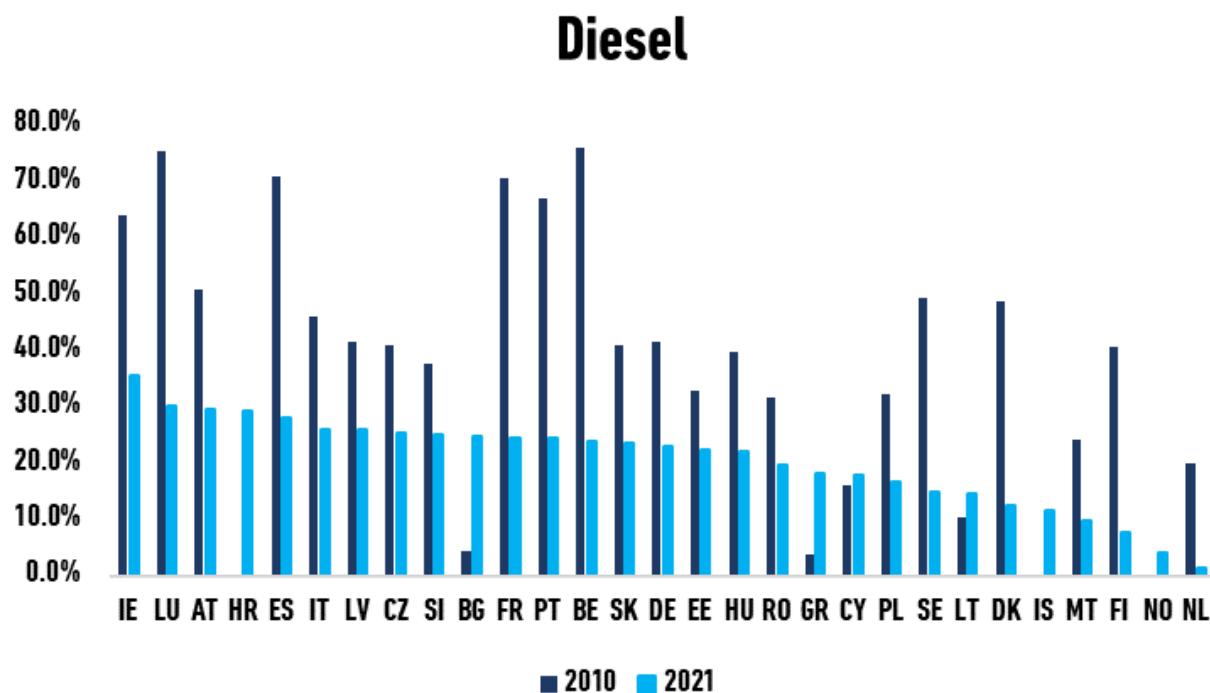
\* GB does not include registrations in 2021



# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

## Diesel cars as a percentage of all cars registered in 2010 vs 2021 by country

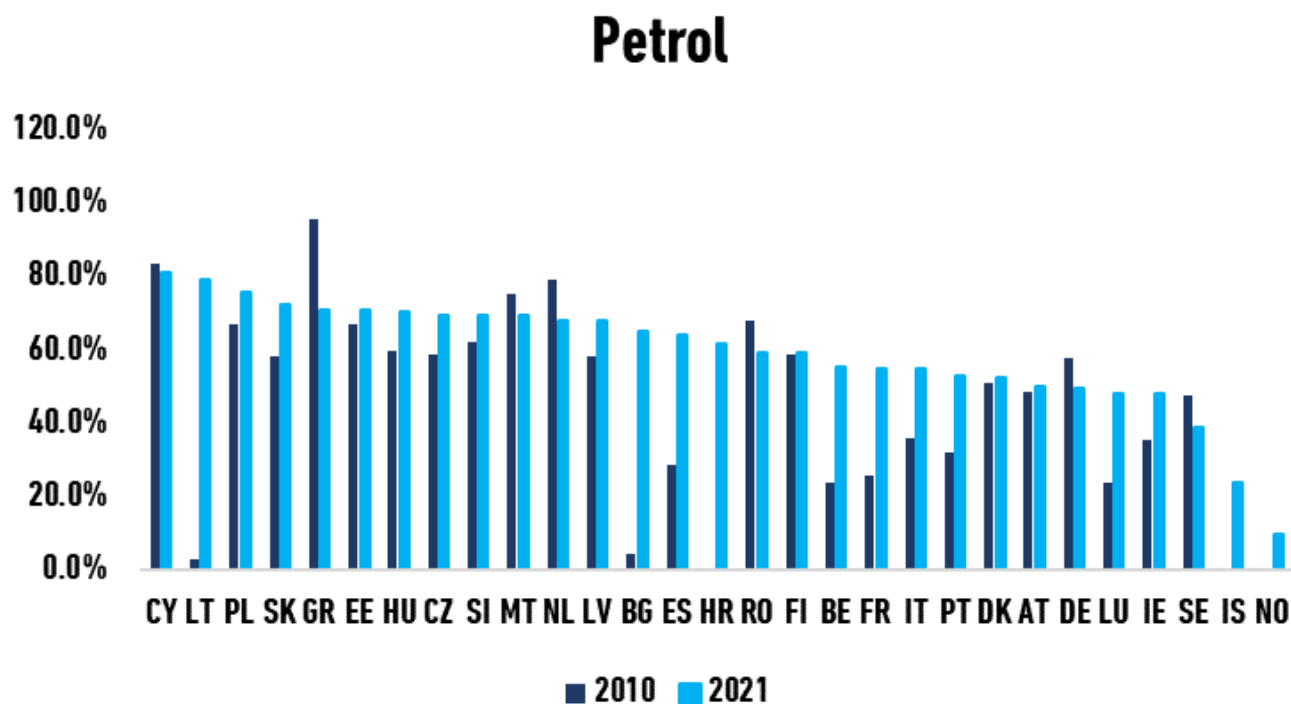
- Highest % of diesel cars – Ireland
- Lowest % of diesel cars - Netherlands



# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

## Petrol cars as a percentage of all cars registered in 2010 vs 2021 by country

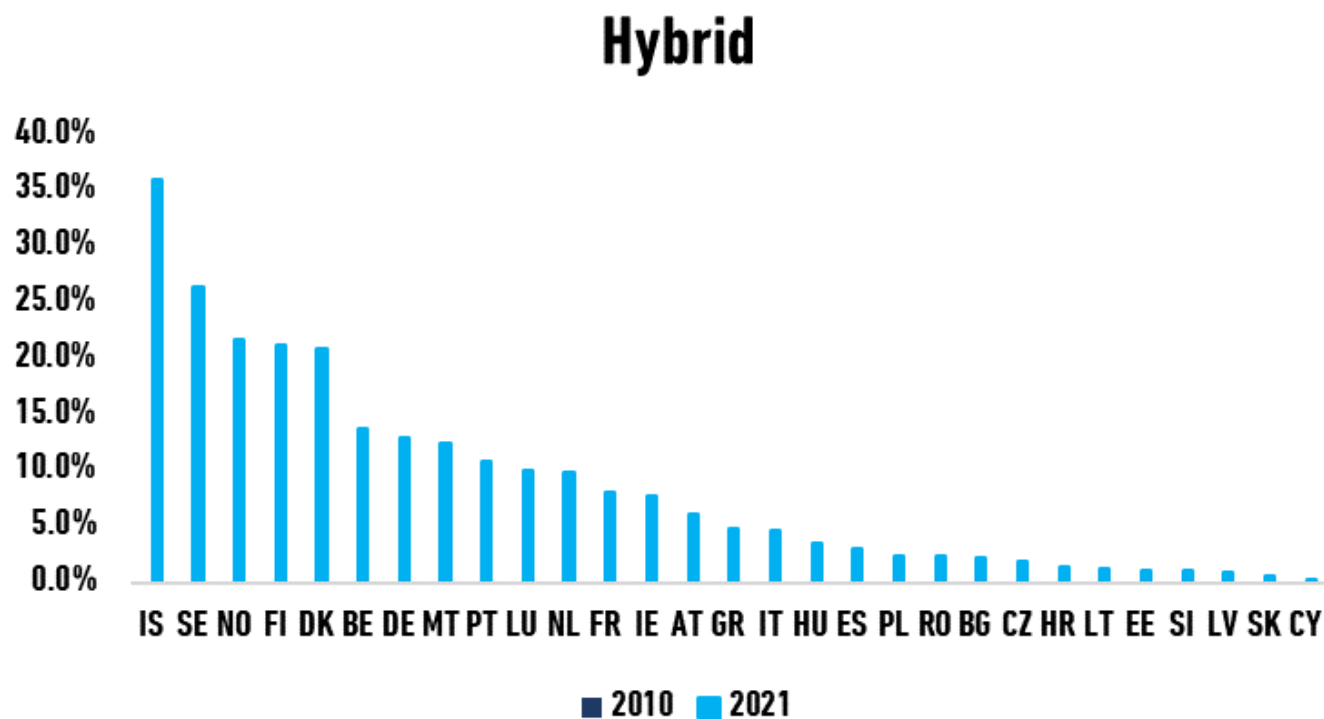
- Highest % of petrol cars – Cyprus
- Lowest % of petrol cars - Norway



# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

## Hybrid cars as a percentage of all cars registered in 2010 vs 2021 by country

- Highest % of hybrid cars – Iceland
- Lowest % of hybrid cars - Cyprus

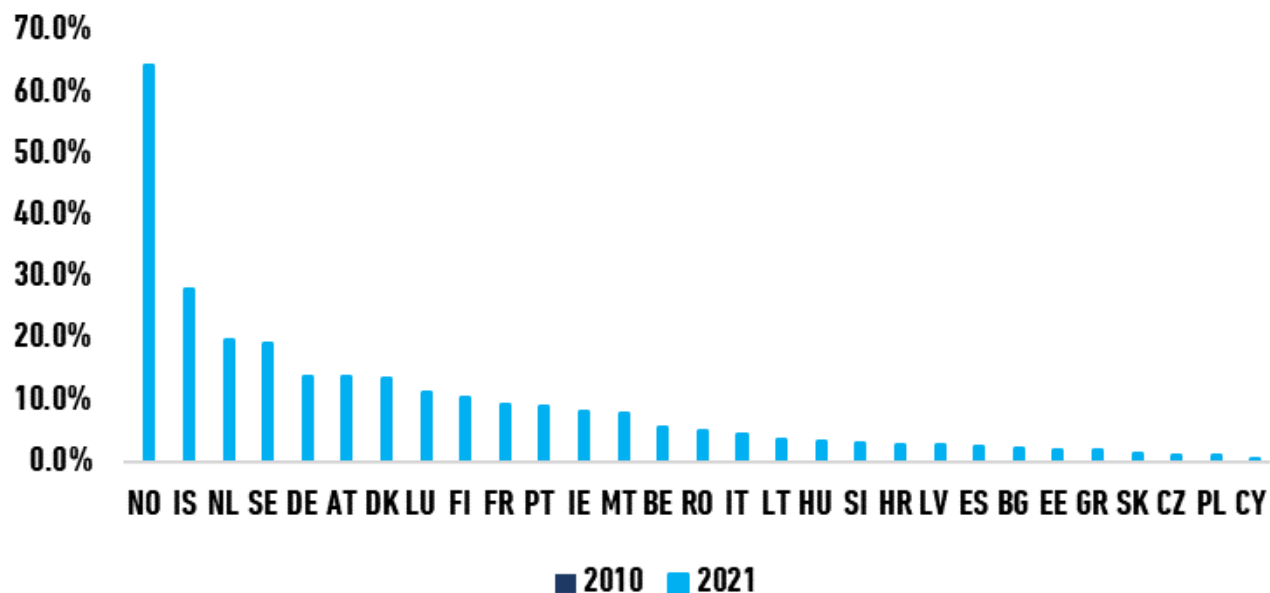


# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

## Electric cars as a percentage of all cars registered in 2010 vs 2021 by country

- Highest % of electric cars – Norway
- Lowest % of electric cars - Cyprus

### Electric

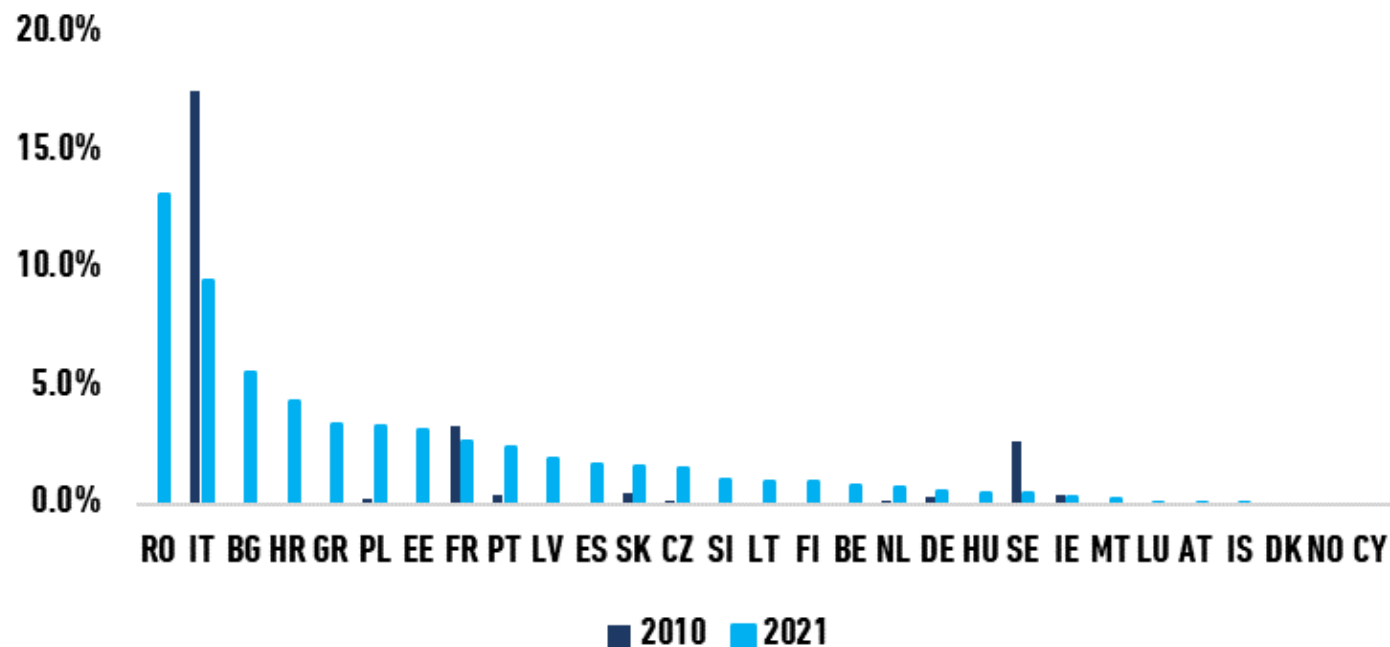


# EUROPEAN ENVIRONMENTAL AGENCY (EEA) DATABASE

## Natural gas cars as a percentage of all cars registered in 2010 vs 2021 by country

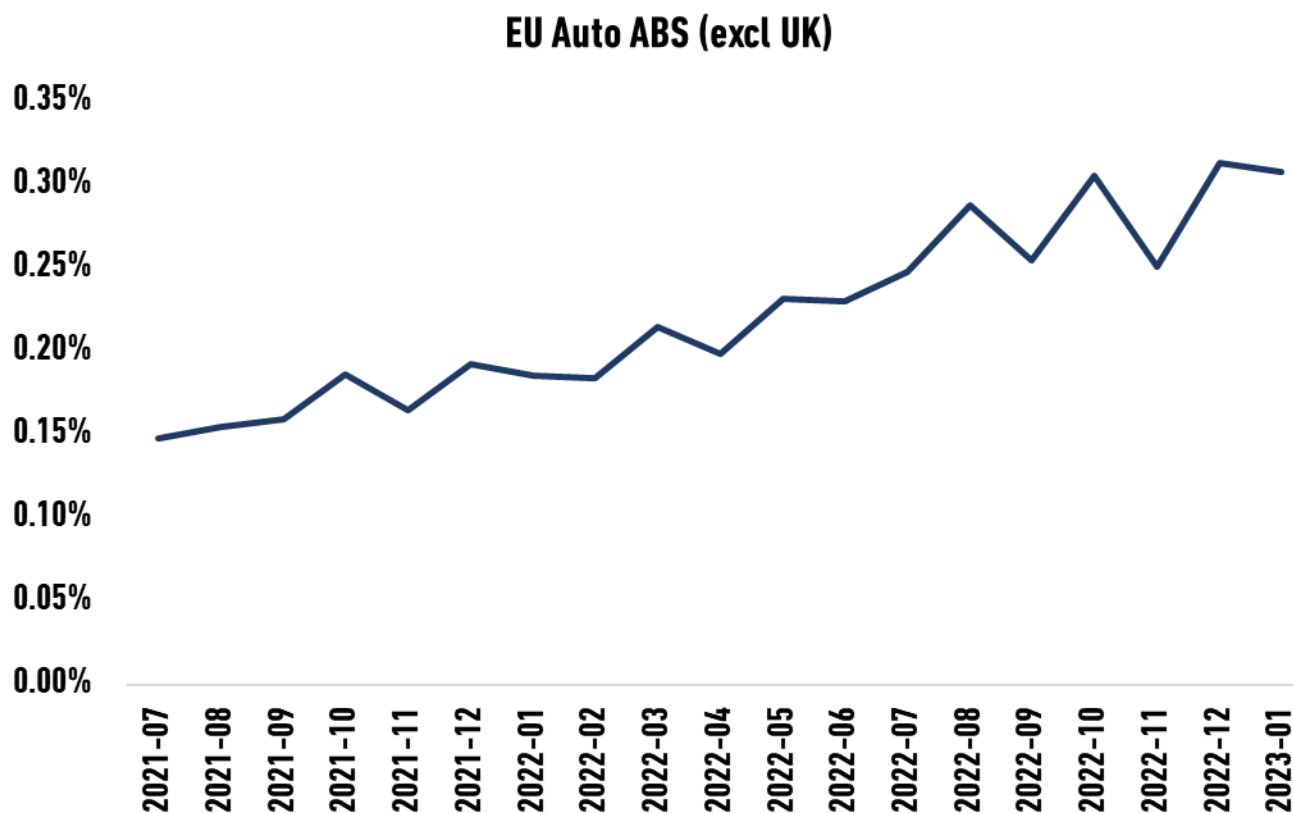
- Highest % of natural gas cars – Romania
- Lowest % of natural gas cars - Cyprus

### Natural Gas



# AUTOS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

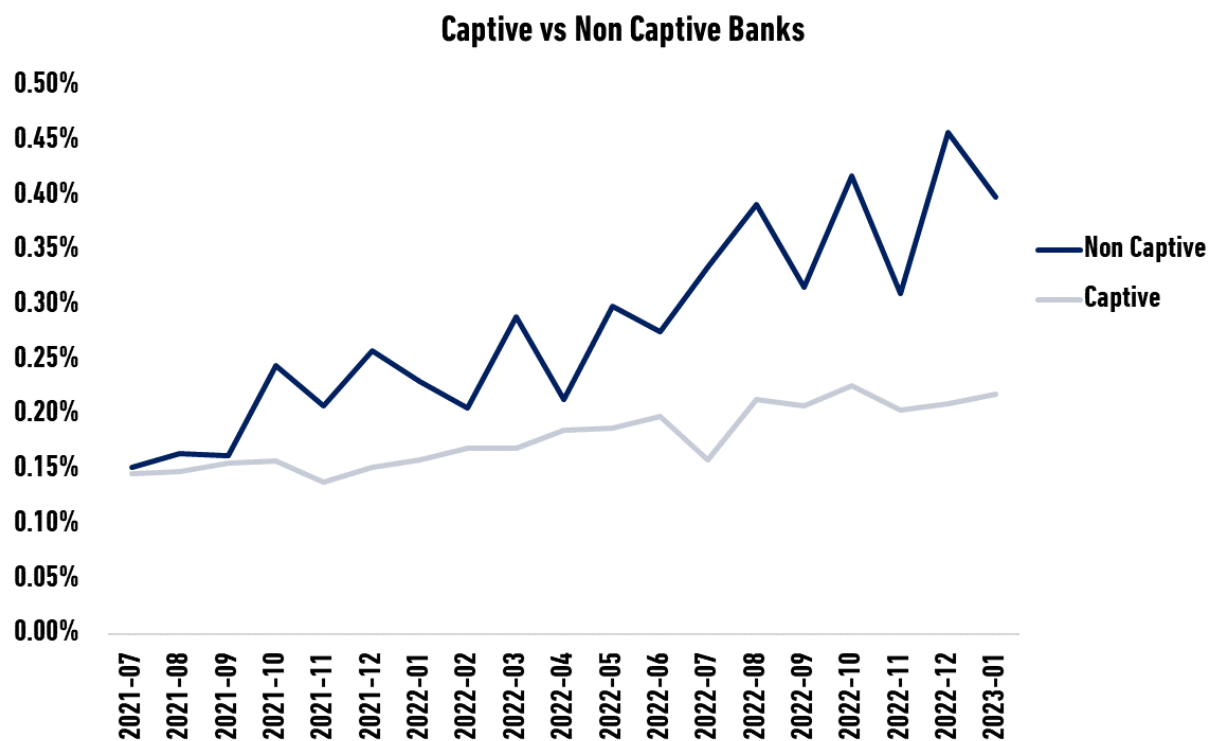
Delinquencies are creeping up slightly but the numbers are still quite low



# AUTOS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

Is there any difference in the delinquencies for ABS deals from Captive vs Non Captive banks?

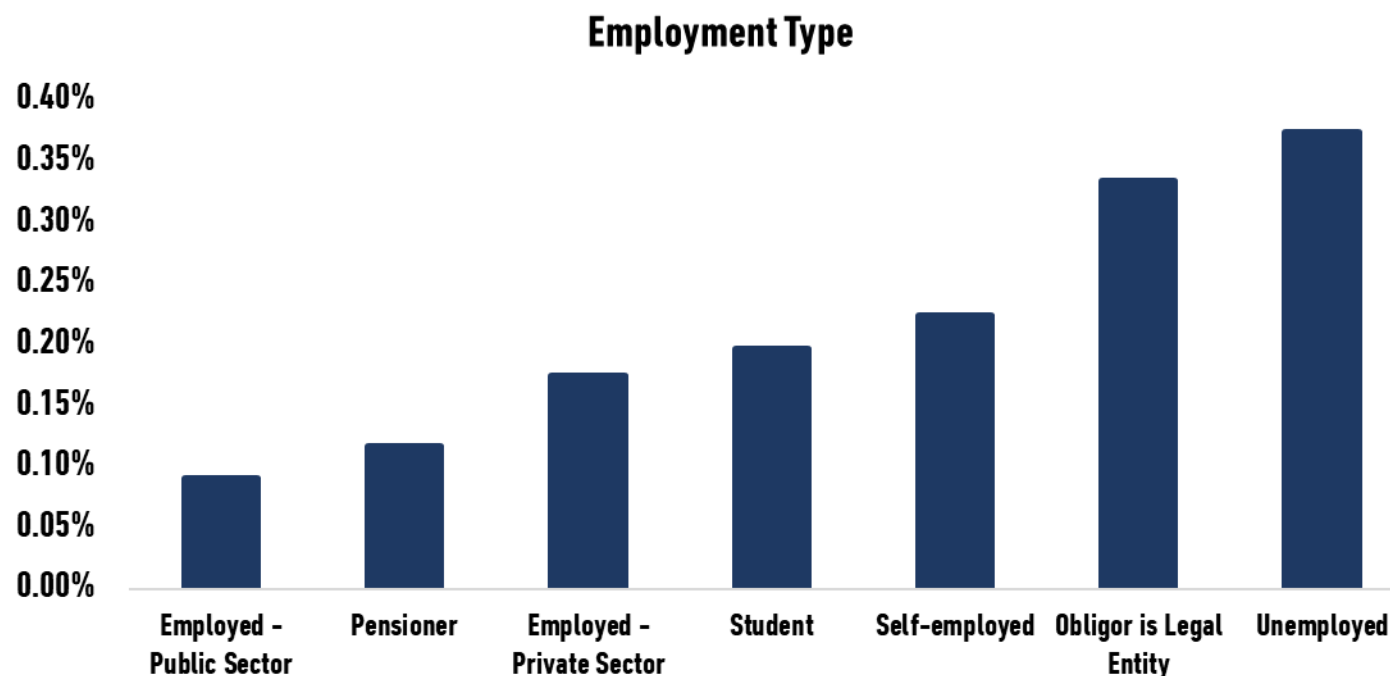
- Captive Banks have lower levels of delinquencies compared to Non Captives



# AUTOS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

What are the differences in delinquencies for borrowers from different types of employment?

- Lowest delinquencies - Public Sector Employees and Pensioners
- Highest delinquencies – Unemployed and Small Businesses





# ESTIMATED CAR WEIGHTS FOR EACH MODEL USING THE EEA DATABASE

Average weight of each model was estimated using the data for 156 million cars and matched with the EDWs Loan level data

## Up to 1000 kg

CITROEN C1  
PEUGEOT 108  
TOYOTA IQ  
VW UP  
KIA PICANTO  
NISSAN PIXO  
SKODA CITIGO

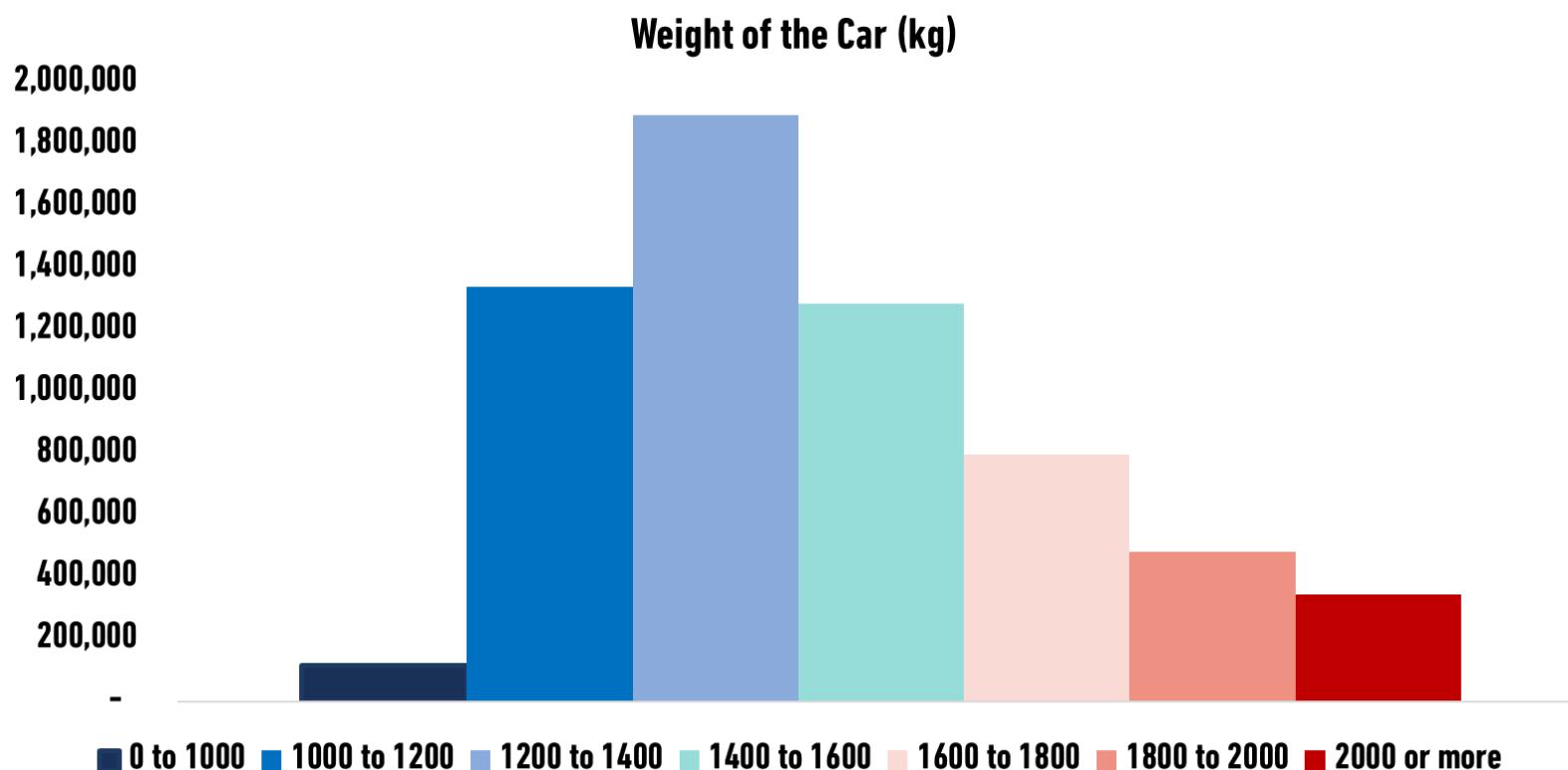
## 2000 kg or more

AUDI Q7  
BMW X7  
TESLA MODEL X  
MERCEDES EQS  
VW PHAETON  
PORSCHE CAYENNE  
VOLVO XC90

# AUTOS – NUMBER OF CARS BY THEIR WEIGHT

What is the distribution of weights across all new registered cars\*?

- Most cars weigh between 1000 to 1600 kilograms

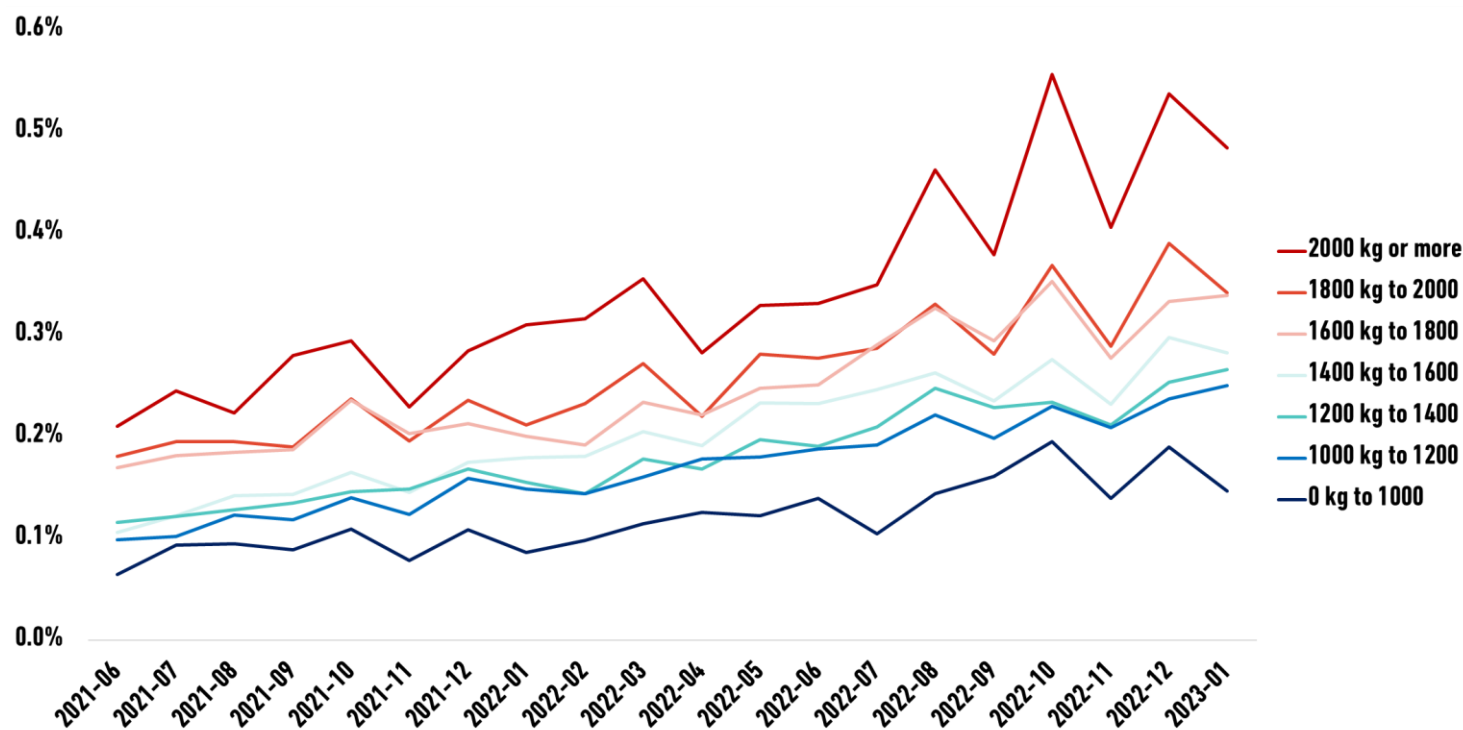


\* Only the countries for which EDW has loan level data are used here

# AUTOS - 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

Is there any difference in delinquencies if cars are grouped by weight?

- The heavier the car, the higher the delinquencies

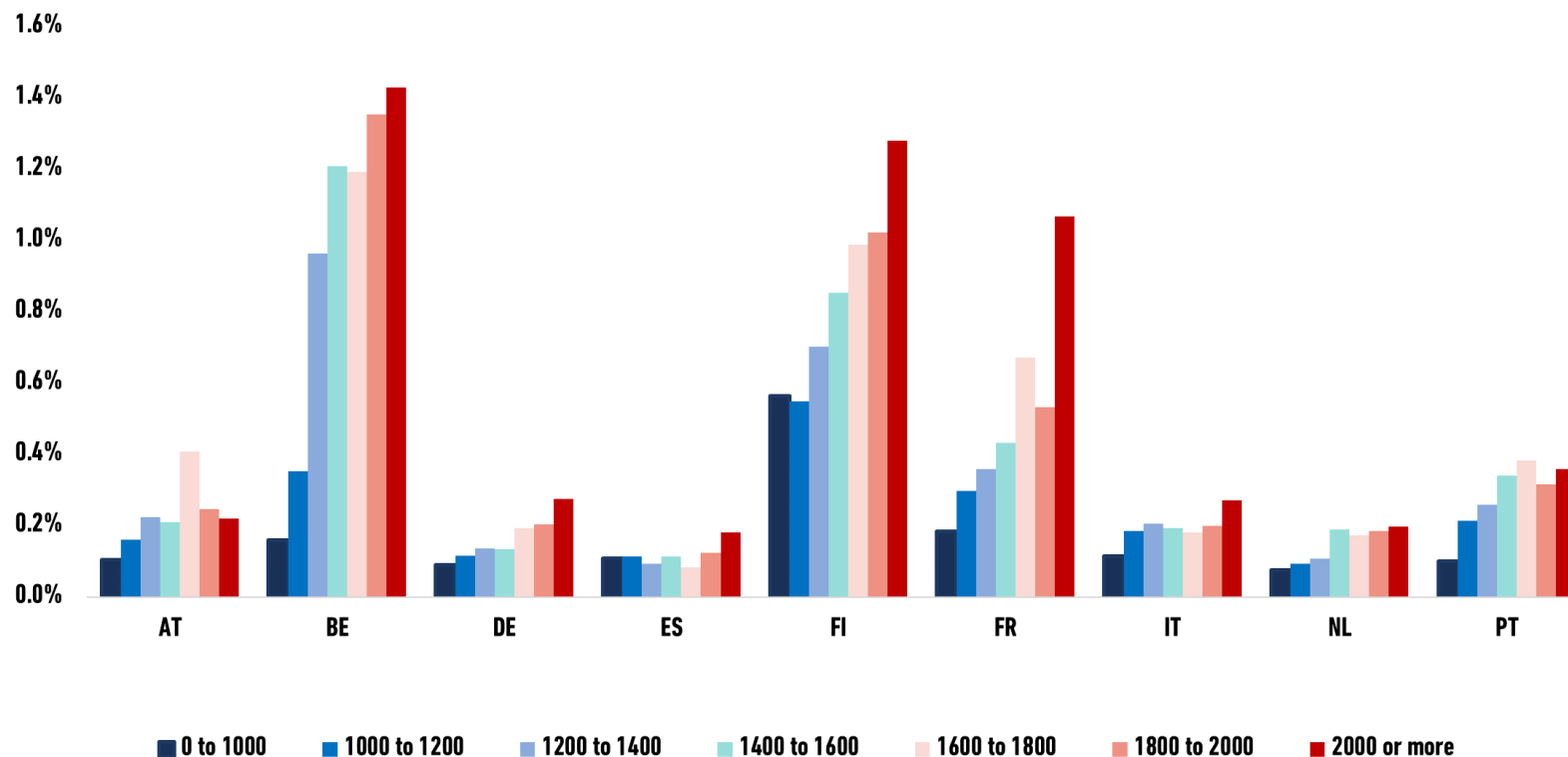


# AUTOS - 30 TO 60 DAYS DELINQUENCY BUCKET

Does this relationship hold for each country?

- **Yes.** For each country, the heaviest cars have the highest delinquency levels

Average of 30 - 60 Days Delinquencies Levels by Weight of the Car (kg)

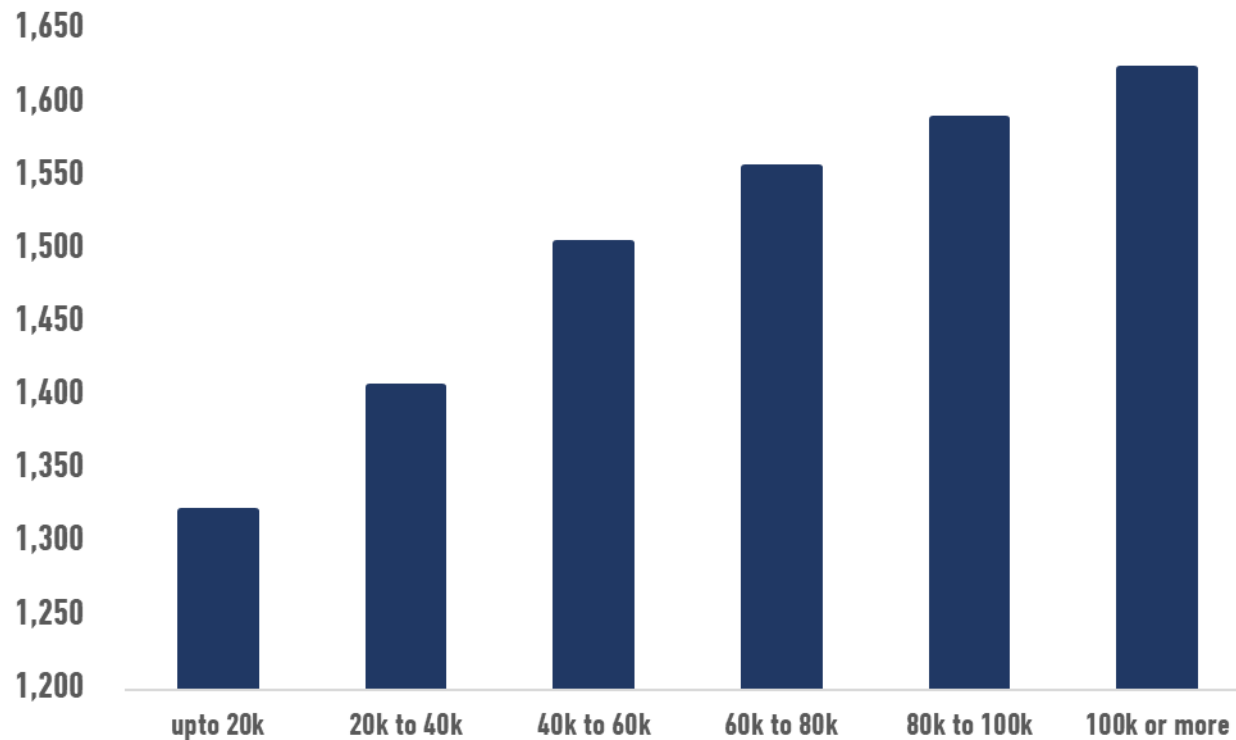


# AUTOS – CAR WEIGHT AND BORROWER INCOME

Is there any relationship between car weight and the income of the borrower?

- The higher the Income, the heavier the car

**Average weight (kg) of the car by Income**



# AUTO – CAR WEIGHT AND BORROWER INCOME

Does the relationship hold for different employment types?

- **Yes.** The higher the income, the heavier the car

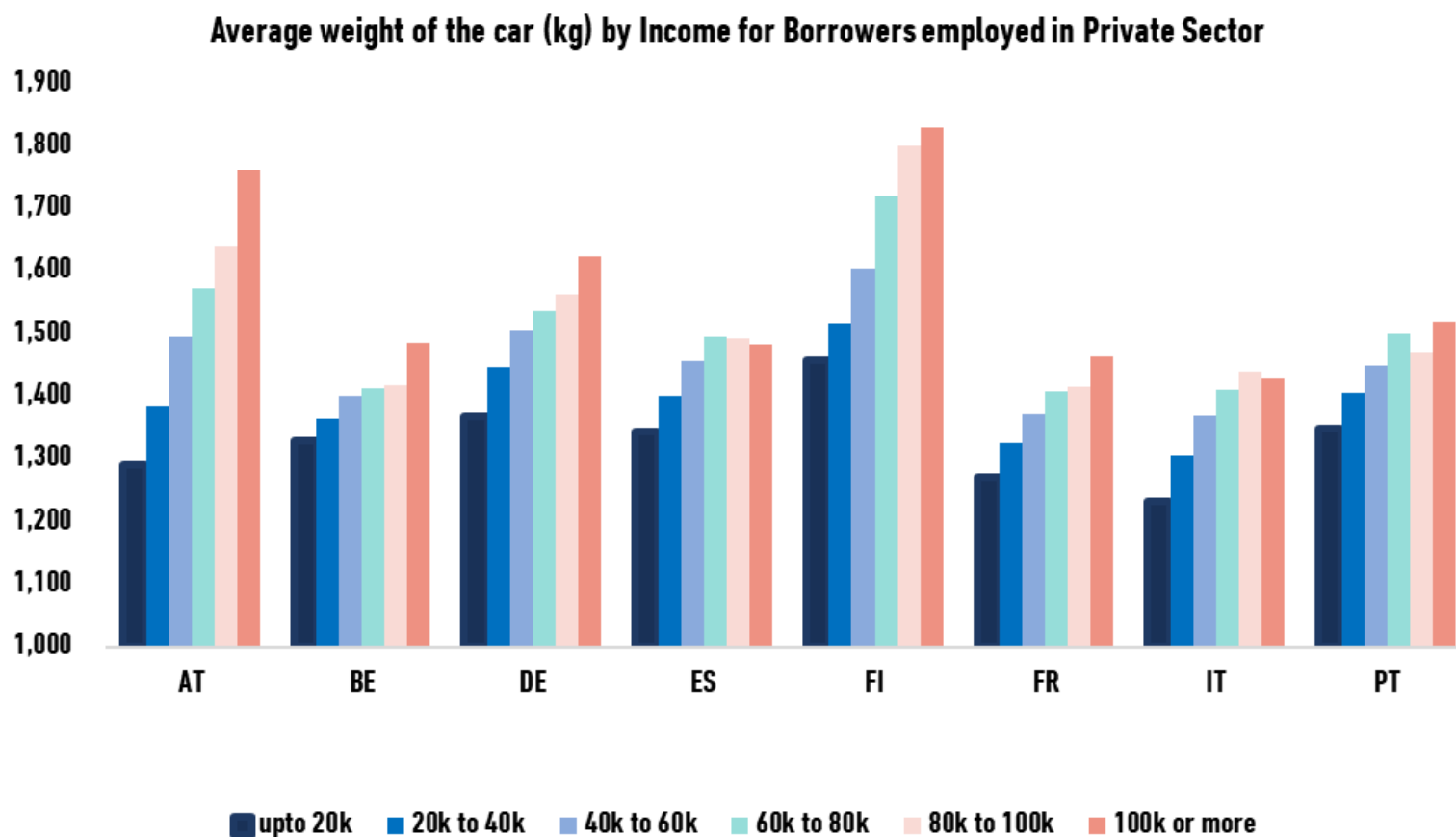
Average weight of the car (kg) by Income and Employment Type



# AUTO – CAR WEIGHT BY COUNTRY

Does the relationship hold across different countries?

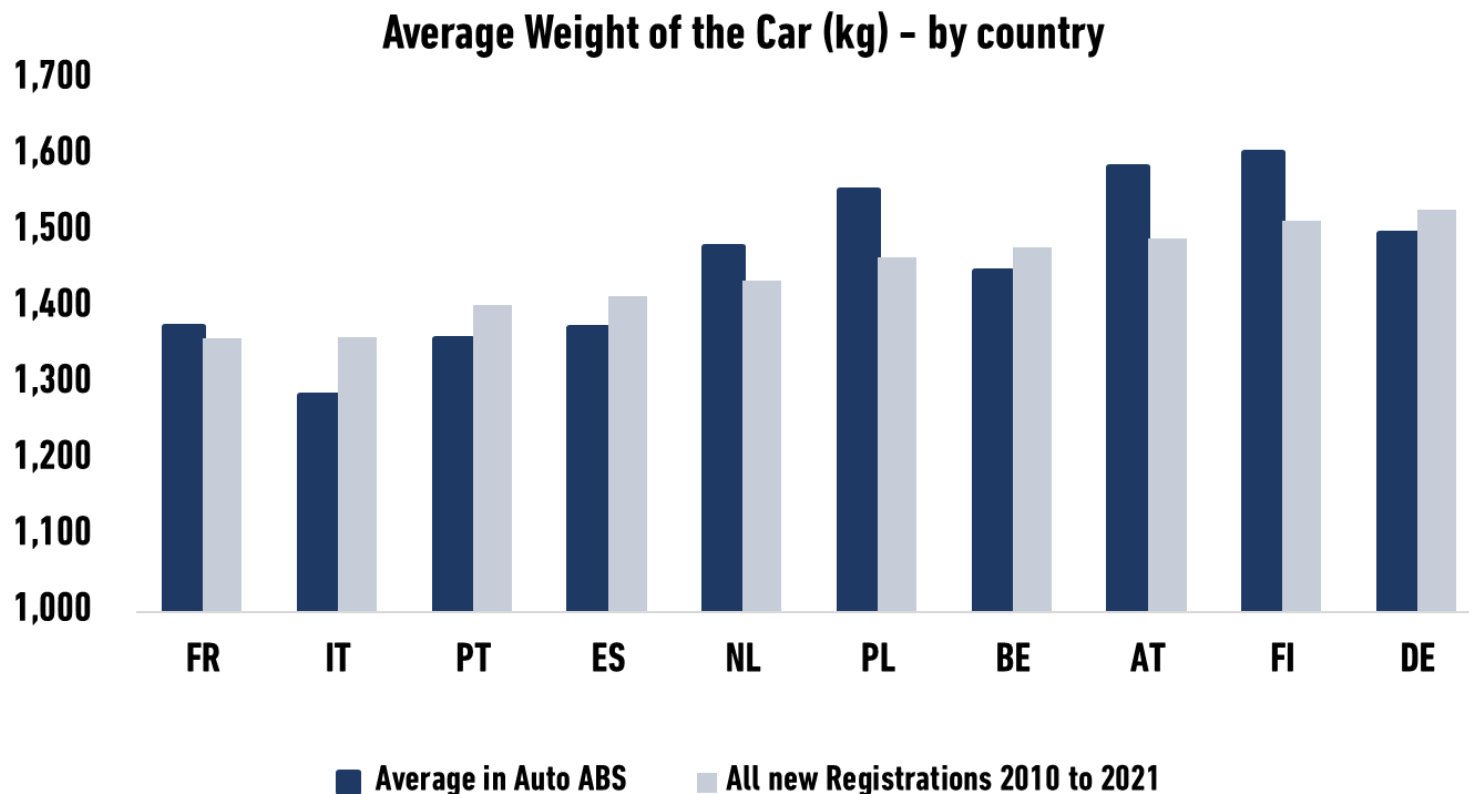
- **Yes.** The higher the income, the heavier the car



# AUTO – CAR WEIGHT BY COUNTRY

Which country has the heaviest cars?

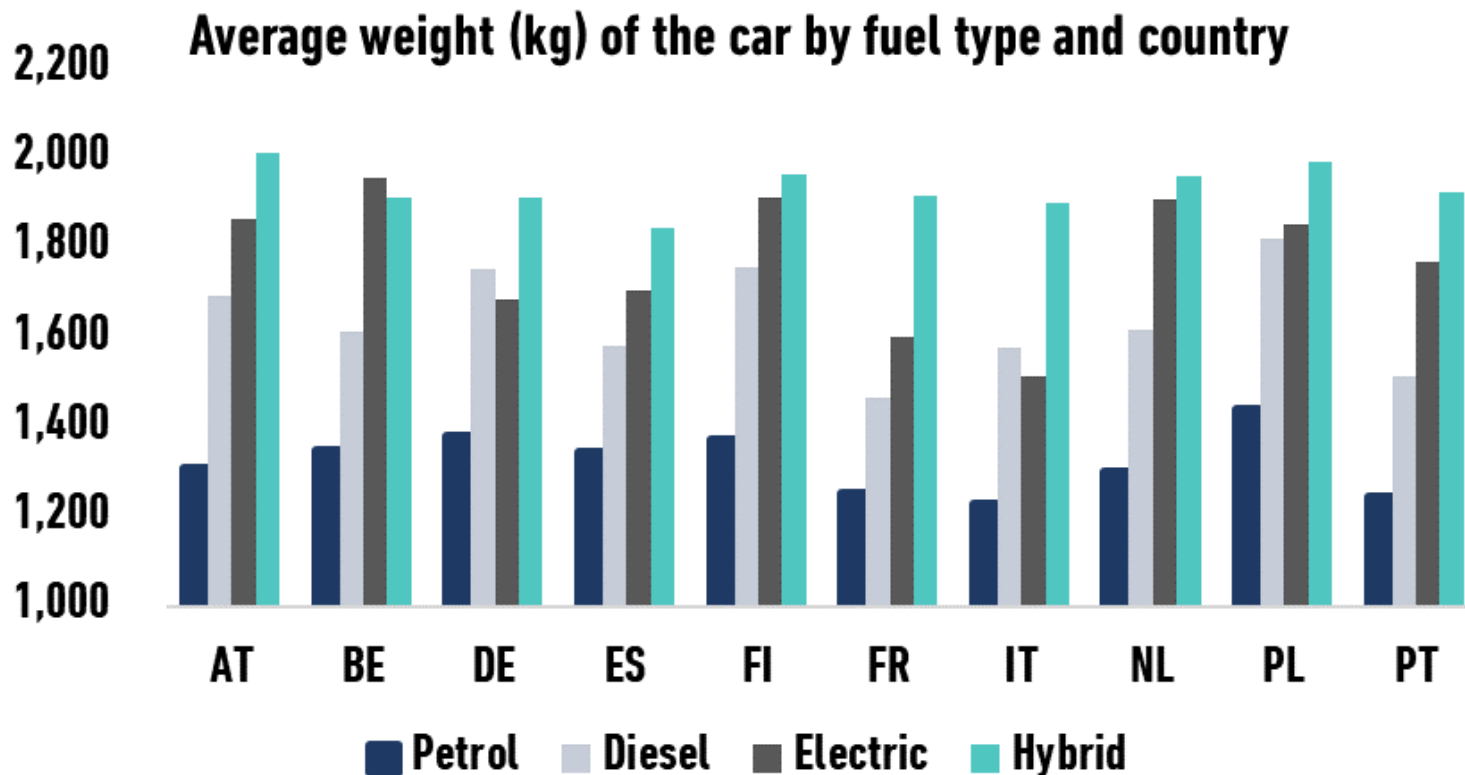
- Heaviest – Germany and Finland
- Lightest – France and Italy





# AUTO – CAR WEIGHT BY FUEL TYPE (2021 REGISTRATIONS ONLY)

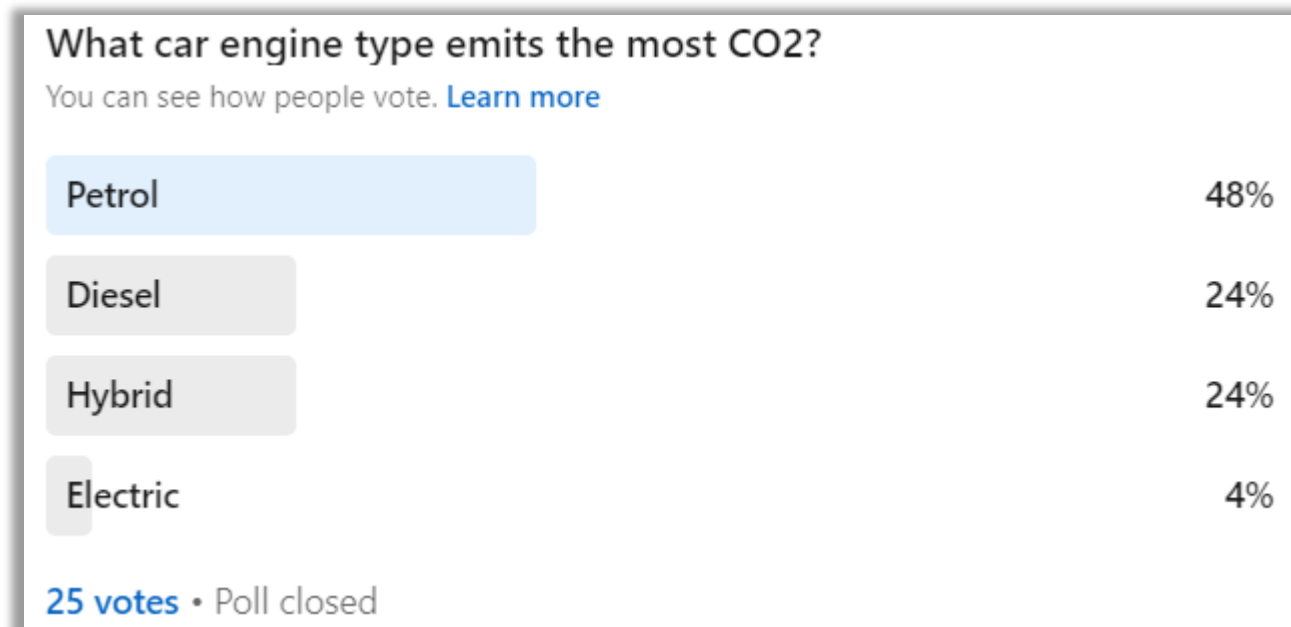
All new registrations in 2021 - Petrol cars are the lightest while hybrids are the heaviest



# LINKEDIN POLL

What car engine type has the highest CO2 emissions?

- Petrol
- Diesel
- Hybrid
- Electric



# WHAT CAR ENGINE TYPE HAS THE HIGHEST CO2 EMISSIONS?

What does Chat GPT say?

US

What car engine type has the highest CO2 emissions?



In general, gasoline engines tend to have higher CO2 emissions compared to diesel engines or hybrid/electric engines. However, the specific CO2 emissions of a car engine depend on various factors such as engine size, fuel efficiency, and driving conditions.



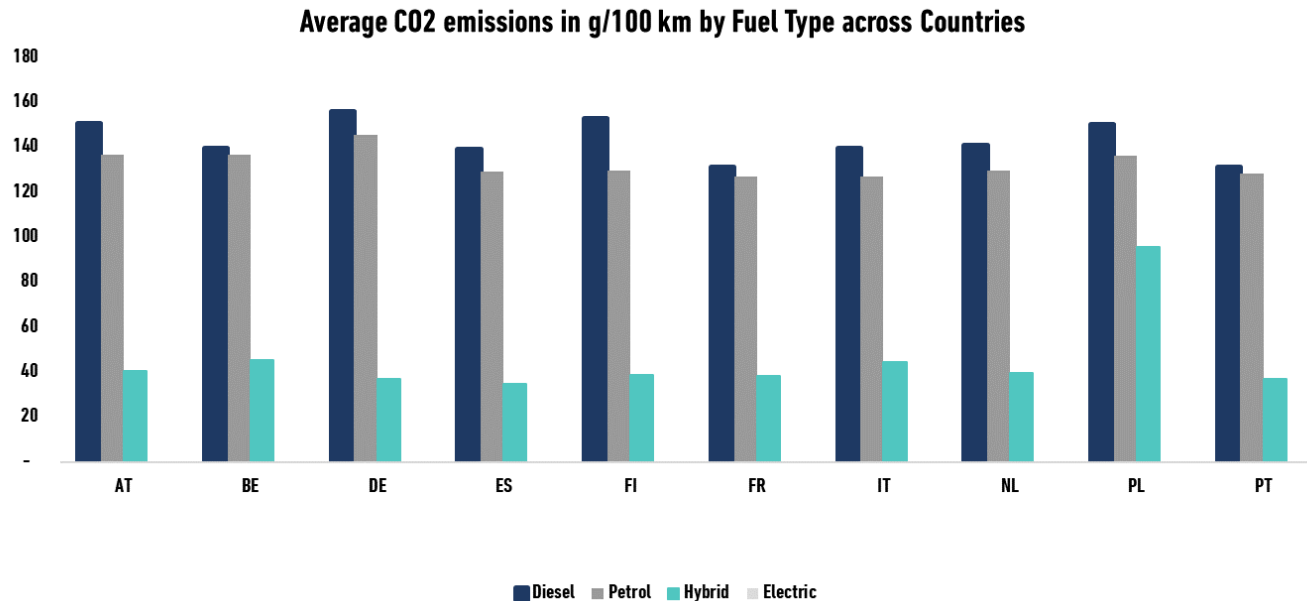
For example, high-performance gasoline engines with larger displacement tend to have higher CO2 emissions compared to smaller, more efficient engines. Similarly, if a gasoline engine is not properly maintained or driven in a way that maximizes fuel efficiency, its CO2 emissions can be higher than a well-maintained diesel engine or hybrid/electric engine.

It's also worth noting that emissions regulations vary by country and region, and newer engines tend to have lower emissions than older engines due to advances in technology and emissions control systems.

# WHAT CAR ENGINE TYPE HAS THE HIGHEST CO2 EMISSIONS?

## What does the data tell us?

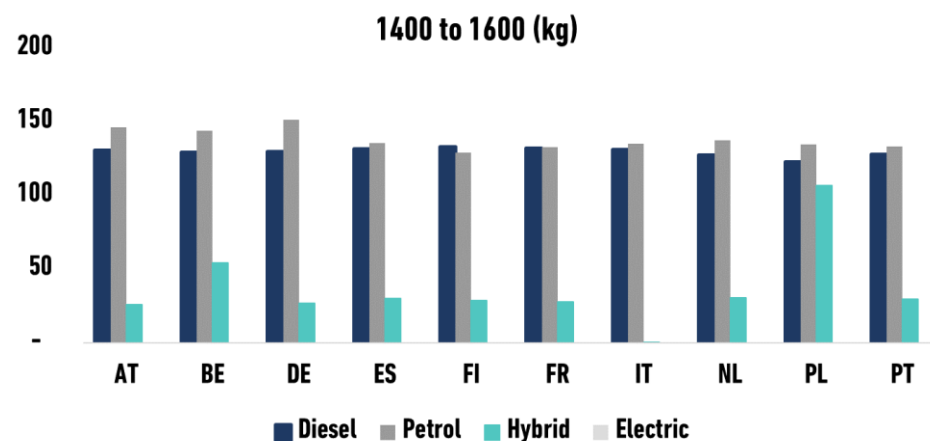
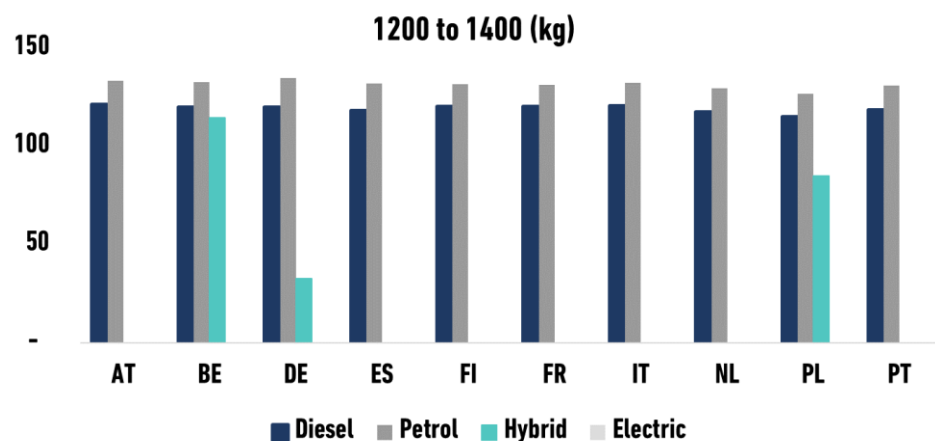
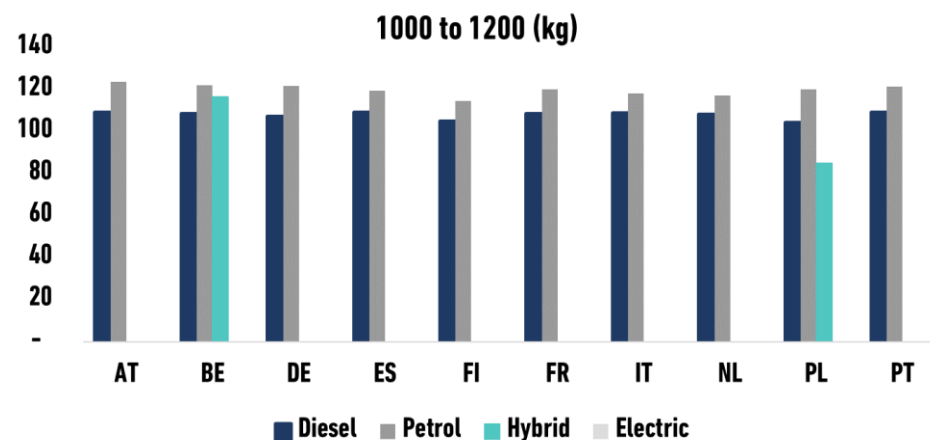
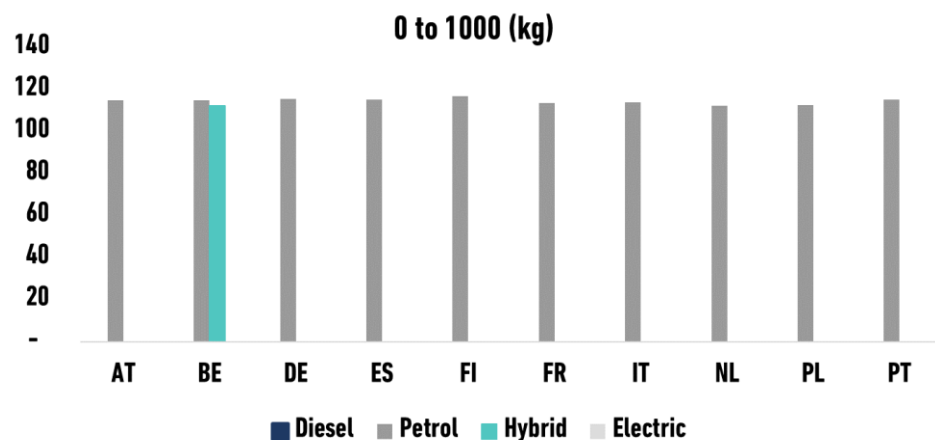
- We looked at New cars registered in 2021 across countries by fuel type and measured the average CO2 emissions in grams/100 km using the WLTP standard



- Average CO2 emissions of Diesel cars is higher than Petrol Cars!!

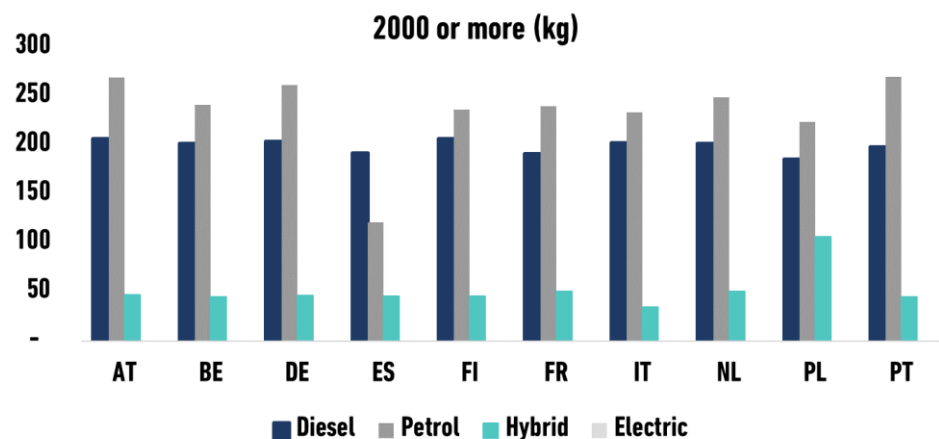
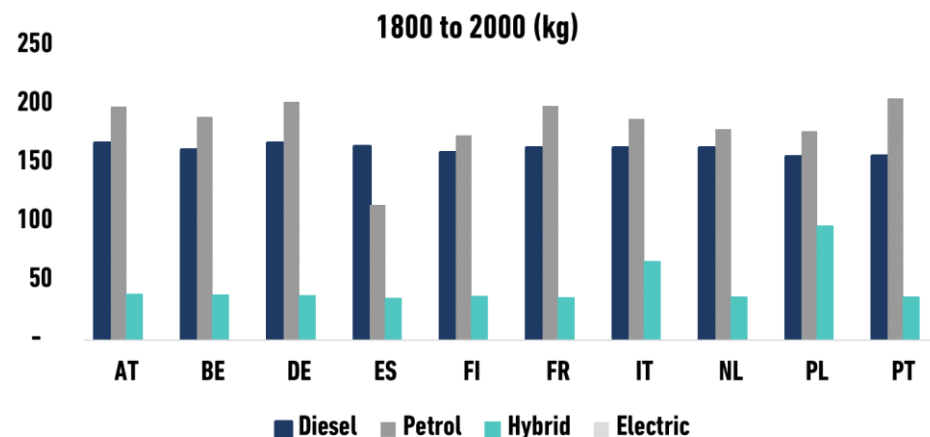
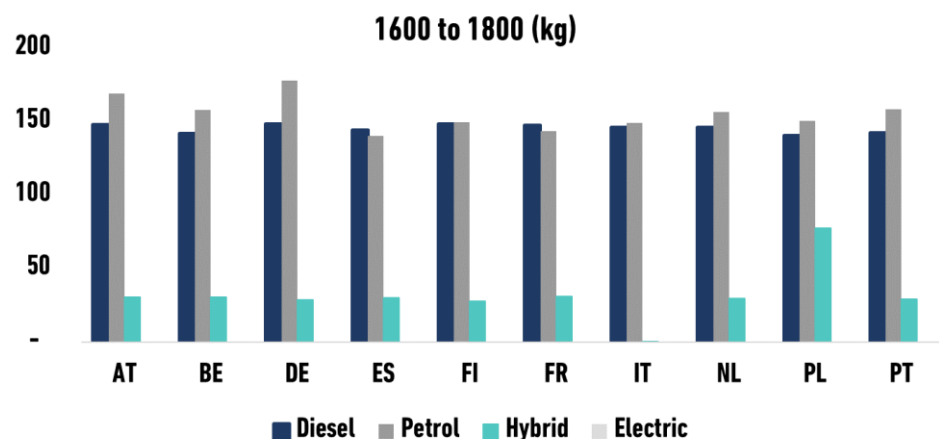
# WHAT CAR ENGINE TYPE HAS THE HIGHEST CO2 EMISSIONS?

What if you consider the weight of the car?



# WHAT CAR ENGINE TYPE HAS THE HIGHEST CO2 EMISSIONS?

What if you consider the weight of the car?



- Within the same weight category, Diesel cars emit less CO2!!!



**Q&A**

# UPCOMING EVENTS

Visit the <https://eurodw.eu/news-events-and-multimedia/events/> page to register for upcoming events

<p><b>22.</b> MAR 2023</p>	<p>EDW's 2023 Greek Securitisation Workshop – Athens</p>
<p><b>25.</b> APR 2023</p>	<p>EDW's 2023 Irish Securitisation Workshop – Dublin</p>
<p><b>09.</b> MAY 2023</p>	<p>EDW's 2023 Spring Italian Workshop – Rome</p>
<p><b>11.</b> MAY 2023</p>	<p>EDW's 2023 Spring Italian Workshop – Milan</p>
<p><b>16.</b> MAY 2023</p>	<p>EDW's 2023 UK Securitisation Workshop – London</p>



# THANK YOU//CONTACT US

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