Driving the Future:
The European Green Auto Securitization Workshop

GOETHE
UNIVERSITÄT
FRANKFURT AM MAIN

LEIBNIZ INSTITUTE
S A F E
Sustainable Architecture
for Finance in Europe

EUROPEAN
DATAWAREHOUSE

Agenda

14:00 – 14:05	**Welcome speech** by Prof. Dr. Loriana Pelizzon (SAFE, Goethe University)
14:05 – 14:20	**Keynote speech** by Prof. Dr. Steven Ongena (University of Zurich)
14:20 – 14:35	**Findings from the GAS project** by Max Riedel (SAFE)
14:35 – 14:50	**Evidence from Auto ABS data** by Andrea Bedin and Usman Jamil (EDW)
14:50 – 15:30	**What are the incentives for ESG disclosures?** Moderator: Christian Thun (EDW) Panelist 1: Dianora Aria De Marco (ISSB) Panelist 2: Paolo Conti (DBRS Morningstar)
15:30 – 16:00	Coffee break
16:00 – 16:55	**Driving the Future: Is It Time for a Sustainable Auto Securitisation Blueprint?** Moderator: Loriana Pelizzon (SAFE) Panelist 1: Marco Angheben (EDW) Panelist 2: Jan Peter Hülbert (TSI) Panelist 3: Jacob Binnema (MUFG Securities) Panelist 4: Liliana Bara de La Fuente (ECB)
16:55 – 17:00	**Closing remarks** by Prof. Loriana Pelizzon
17:00 – 18:00	Get together/networking with drinks and snacks

Welcome speech

Prof. Dr. Loriana Pelizzon

(Leibniz Institute for Financial Research SAFE, Goethe University)

Keynote speech

Prof. Dr. Steven Ongena

(University of Zurich)

14:05 – 14:20

Driving the Future: European Green Auto Securitization
Green Auto Securitisation (GAS)
8 November 2023

Do Lenders Price the Brown Factor in Car Loans?
Evidence from Diesel Cars

Winta Beyene (University of Zurich, SFI)

Steven Ongena (University of Zurich, SFI, KU Leuven, NTNU Business School, CEPR)

Matteo Falagiarda (ECB)

Alessandro Scopelliti (KU Leuven, U. Zurich)

Motivation

Banks financing «brown»?

- o Banks have traditionally been large lenders to brown industries, e.g. fossil industries
- o Potential conflict of interests that may distort banks' integration of transition risks

Large share of households purchase cars using bank loans

- o Fundamental asset tied to environmental degradation
  - → Uncertainty over the future value
- o Loan conditions
  - → Consumer vehicle choice

This paper: Do banks price the brown factor? Evidence from diesel cars

- o Does the vertical integration between production and financing alter banks responses to environmental shocks?

Paper summary

RQ: Do banks adjust lending price and terms in response to different shocks to the perceived environmental quality and local usability of diesel vehicles?

1) Information shock: Diesel emissions scandal in the automobile sector in 2015.

2) Collateral shock: Local policy changes regarding circulation restrictions due to air pollution.

o **Data:** Sample of car loans securitized by European banks and captive lenders

o **Methodology:** The impact of «Dieselgate» and local policy shocks on bank credit conditions

o **Key results:** Captive banks adjust loan conditions in a more favorable way for the purchase of diesel cars produced by their own parent carmakers.

o **Interpretation:** Potential conflict of interests that may distort banks' integration of transition risks.

Related Literature

o Role of banks in the green transition

o Lending behavior of captive financial intermediaries

o Primary and secondary car market

Related Literature

o **Role of banks in the green transition**

   o Do banks direct funds away from pollution-generating technologies? (Beyene et al., 2021; De Haas and Popov, EJ 2023; Bolton and Kacperczyk, JFE 2021)

   o Costs associated with the green transition are inevitable, but priced appropriately? (Hong et al JE 2019; Roncoroni et al. JFS 2021; European Systemic Risk Board, 2020)

   o Potential conflicts of interest of the financial intermediaries (Benincasa et al., 2021; Laeven & Popov, 2021; Degryse et al., 2020; Brown et al., JFI 2017; Minetti, RF 2011)

Related Literature

o **Role of banks in the green transition**

o **Lending behavior of captive financial intermediaries**
  - o When manufacturers are also lenders, they internalize the dynamic implications of their own production and sales (Murfin and Pratt, JF 2019; Barron et al., JMCB 2008)
  - o Vertical integration between production and financing alters banks responses to economic shocks (Benetton et al., 2021; Benmelech et al., QJE 2017)

Related Literature

o Role of banks in the green transition

o Lending behavior of captive financial intermediaries

o Primary and secondary car market
  o Used cars are a substitute to the new car production. Resale market limits market power of producer (Gavazza et al., AER 2014, Levinthal and Purohit, MS 1989)

Empirical Prediction

Shock to value of diesel cars → Resale value → New car sales

$$p_t = a - b(q_t) + p_{t+1}$$

(e.g. Murfin and Pratt, JF 2019; Bulow, QJE 1986)

With bank financing …

o Independent bank → Credit constraints

o Captive bank → Incentive to preserve rents through financing own products
  o Place **existing stock** of used cars
  o Support **new diesel car sales** of their parent car manufacturer

Empirical Strategy

1) **Shocks to the perceived environmental quality of diesel vehicles**
   o Diesel emission scandal in 2015
      o Diesel cars have been emitting four to seven times more NOx in on-road driving than in type approval tests.
   o Local emission restrictions
      o Circulation restrictions on more polluting vehicles going into city centers.
      o Local pollution levels

2) **Petrol cars as control group** allows for identical car characteristics (same model) to the treatment group in all aspects except for the environmental shocks.

3) **Collapse data** (borrower's income group, car model, region, and fuel type) **in pre- and post event periods before differencing**

Empirical Strategy

1) **Shocks to the environmental quality of diesel vehicles**

o Diesel emission scandal: Information shock
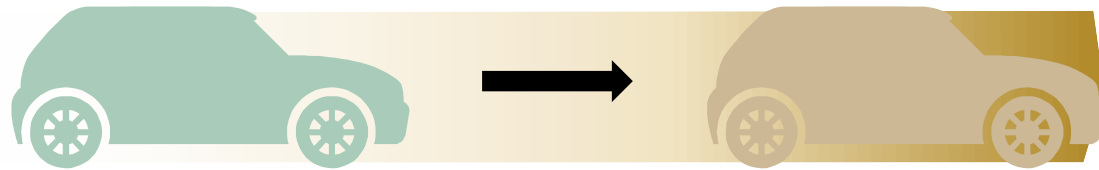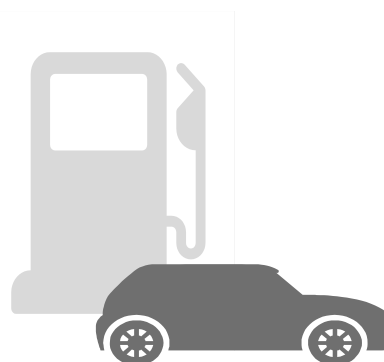
o Local circulation restrictions: Collateral shock
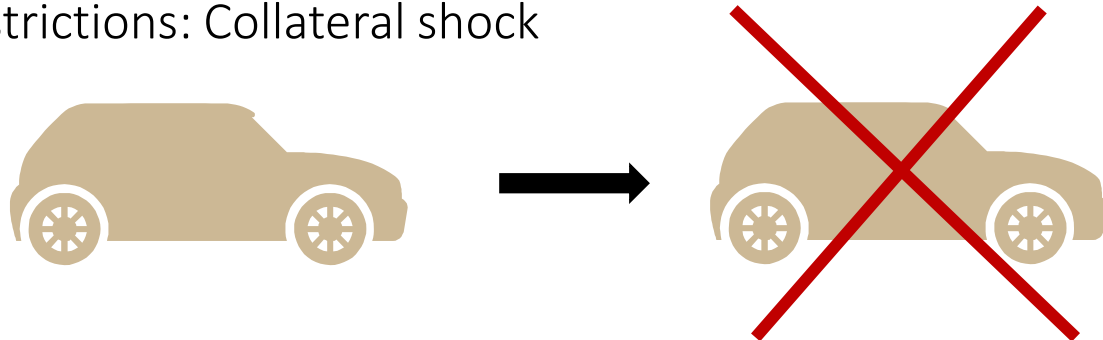
Empirical Strategy

2) **Petrol cars as control group** allows for identical car characteristics (same model) to the treatment group in all aspects except for the environmental shocks

Treated: Diesel
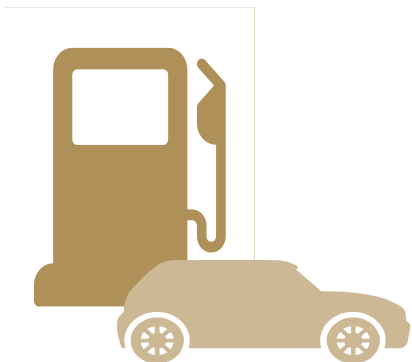
Control: Petrol

2) **Collapse data** (borrower's income group, car model, region, and fuel type) **in pre- and post event periods before differencing**

Sample construction

o Sample of car loans securitized by European banks and captive lenders available through the European Data Warehouse

    o Used cars originated between 2006 and 2018 in Germany, Italy, France, and Spain

    o Identification strategy requires brand-model and fuel type

Table 1. Summary statistics

|	N	sd	mean	min	max
Interest rate (% per annum)	781,033	2.349	7.544	0	15
Primary income (EUR)	691,663	1.015e+06	27,571	0	8.400e+08
Loan term (months)	781,036	16.34	55.32	4	147
Down payment amount (EUR)	780,875	36,675	6,145	0	2.090e+07
Loan-to-value (%)	780,732	35.21	62.89	0	455
Car valuation (EUR)	577,357	5,586	14,072	900	1.100e+06
In arrears (binary)	781,045	0.204	0.043	0	1
Captive bank	781,045	0.4324	0.7509	0	1

Diesel Emission Scandal

The diesel emission scandal caused a quasi-experimental shock to the perceived environmental quality of diesel vehicles

Pre-period	Post-period
Sep. 2014 – Sep. 2015	Sep. 2015 – Sep. 2016

Dieselgate timeline:
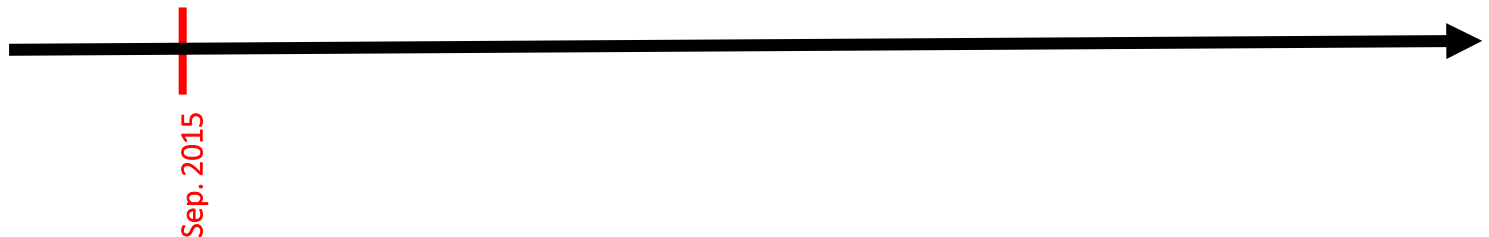
Sep. 2015

Diesel Emission Scandal

The diesel emission scandal caused a quasi-experimental shock to the perceived environmental quality of diesel vehicles

| Pre-period	Post-period
Sep. 2014 – Sep. 2015	Brand specific date + 1y

Dieselgate timeline:
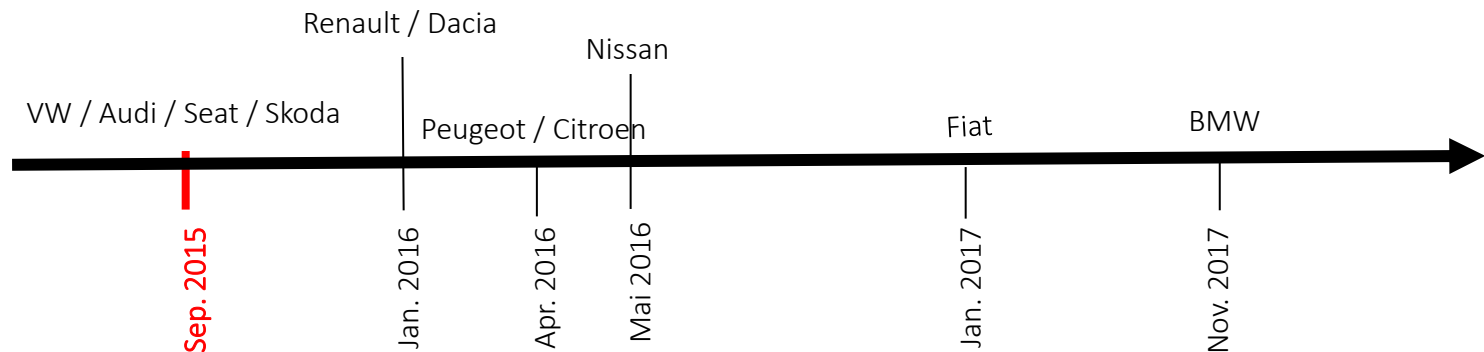
Main Results: Diesel Emission Scandal

$$\Delta\text{Interest Rate}_{m,b,r,i,f} = \beta\text{Diesel}_{m,b,r} + \gamma X + \mu_m + \mu_{b,r} + \mu_{l,i} + \varepsilon_{m,b,r,i,f}$$

	All banks	All banks (fuel pairs)	Captive banks	Independent banks
Dependent variables: ΔInterest rate				
Diesel	-0.172***	-0.227***	-0.250***	-0.023
	(0.052)	(0.049)	(0.062)	(0.056)
Dependent variables: ΔLoan-to-value				
Diesel	0.982**	1.286***	1.483**	0.0407
	(0.424)	(0.486)	(0.601)	(0.537)
Borrower/Loan Controls	Yes	Yes	Yes	Yes
Model FE	Yes	Yes	Yes	Yes
Bank- Region FE	Yes	Yes	Yes	Yes
Brand-Income group FE	Yes	Yes	Yes	Yes
Model-Fuel Type Clustered SE	Yes	Yes	Yes	Yes
Observations	20,530	9,390	11,870	8,648

- o Captive banks apply more favorable lending conditions for diesel cars relative to petrol cars post brand-specific emission scandal.
  - o Interest rate: 25 basis points equals to 3-4 percent less in annual percentage rate.
  - o LTV: 1-2 percentage points.

Local Emission Restrictions

Low emission zones (LEZ) in Germany:

o Local measures against traffic-related air pollution

    o 52 LEZ staggered, since 2008

    o Diesel > Euro 4 / Petrol > Euro 1

    o 24 hours a day, 365 days a year

Legend:
- 2008-2011
- 2012-2015
- 2016-2018
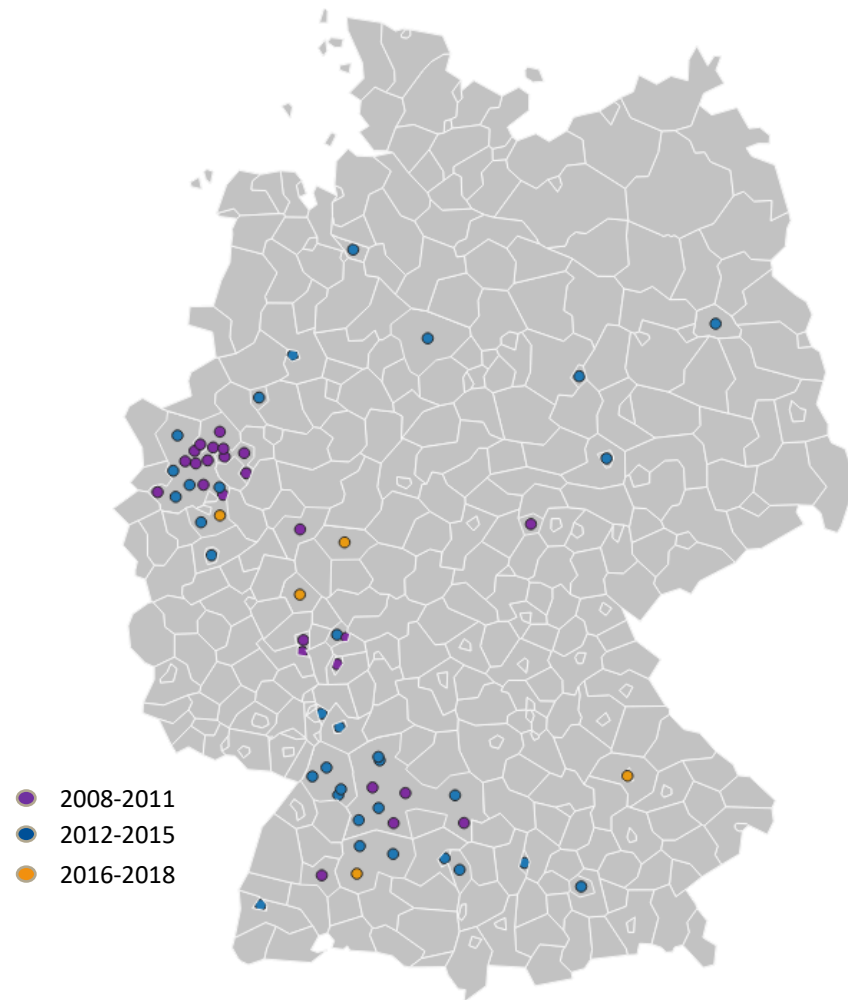
Main Results: Local Emission Restrictions

$$\Delta\text{Interest Rate}_{m,b,c,i,f} = \boldsymbol{\beta}\text{Diesel}_{m,b,c} + \gamma X + \mu_m + \mu_{b,c} + \mu_{l,i} + \varepsilon_{m,b,c,i,f}$$

Dependent variables:	Captive banks		Independent banks	
	Interest rate	Loan-to-value	Interest rate	Loan-to-value
Diesel	0.0518	-0.832	0.122**	0.087
	(0.059)	(0.945)	(0.060)	(0.708)
Borrower/Loan Controls	Yes	Yes	Yes	Yes
Model FE	Yes	Yes	Yes	Yes
Bank-County FE	Yes	Yes	Yes	Yes
Brand-Income group FE	Yes	Yes	Yes	Yes
Model-Fuel Type Clustered SE	Yes	Yes	Yes	Yes
Observations	2509	2509	4276	4276
R2	0.911	0.899	0.869	0.916

- For captive banks we do not observe a significant change in loan conditions in any direction.
- Independent banks charge higher interest rates post the introduction of LEZs by approximately 12 basis points.

Local pollution levels

o High air pollution → Regulatory and public
   interest to reign in traffic pollution → **LEZ**
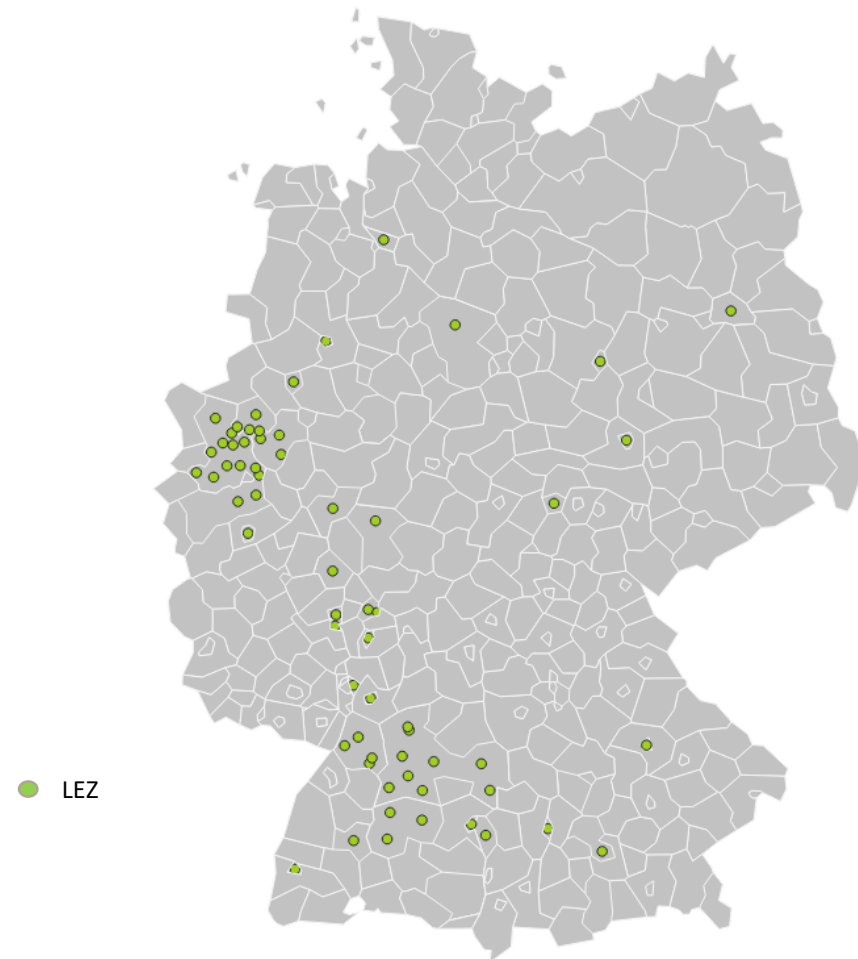
● LEZ

Local pollution levels

o High air pollution → Regulatory and public interest to reign in traffic pollution

o The EU limit value for NO_2 is **40** micrograms per cubic meter (µg/m3) on an annual average

LEZ

> NO_2 40 µg/m³
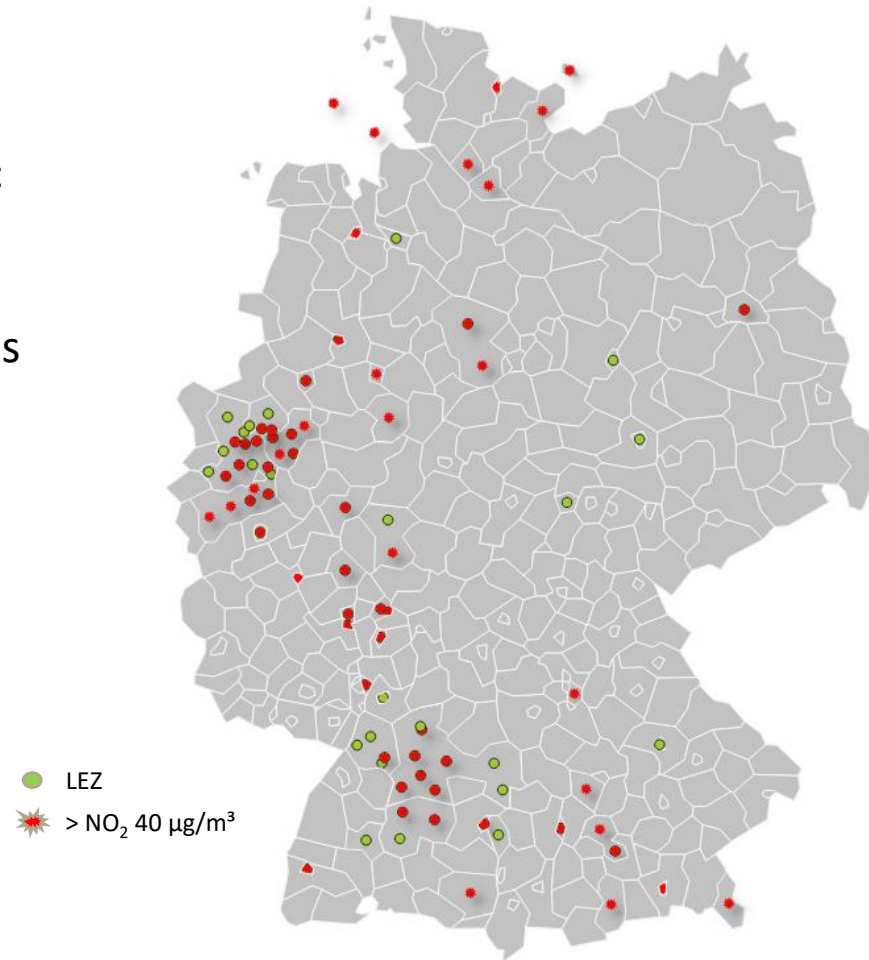
Main Results: Local pollution levels

$$\text{Interest Rate}_{m,b,c,i,f} = \beta_0 + \beta_1 \text{Diesel}_{m,b,c} + \beta_2(> \text{NO}_2\ 40\ \mu g/m^3) + \boldsymbol{\beta_3}\text{Diesel}_{m,b,c} \times (> \text{NO}_2\ 40\ \mu g/m^3)$$
$$+ \gamma X + \mu_m + \mu_y + \mu_d + \mu_{b,c} + \mu_{c,i} + \varepsilon_{m,b,c,i,f}$$

Dependent variables:	Captive banks				Independent banks	
	Interest rate		Loan-to-value		Interest rate	Loan-to-value
	Own	Other	Own	Other		
(> NO2 40 µg/m³) x Diesel	**-0.010**	**0.202****	**0.011**	**-0.180**	**0.109*****	**-0.358**
	(0.033)	**(0.081)**	**(0.530)**	**(1.131)**	**(0.031)**	**(0.433)**
Diesel	-0.041*	-0.178***	-1.057	1.777*	0.073***	1.781***
	(0.024)	(0.061)	(0.870)	(0.961)	(0.026)	(0.402)
(> NO2 40 µg/m³)	0.094*	-0.050	0.997*	2.529***	-0.088	0.989**
	(0.050)	(0.090)	(0.592)	(1.147)	(0.038)	(0.402)
Borrower/Loan Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank- Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Brand-Income group FE	Yes	Yes	Yes	Yes	Yes	Yes
Model-Fuel Type Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
District Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,079	2,855	33,079	2,855	106,315	106,315
R2	0.449	0.507	0.449	0.507	0.331	0.331

- Captive banks increase interest rates for competitors' diesel car models following the surpassing of the critical NO_2-level (20 basis points) to a larger extent than independent banks.

Conclusion

o Captive banks apply more favorable loan conditions relative to independent banks for the purchase of cars produced by their own parent carmakers.

o The «brown» factor is priced if there is a risk of transition and/or green regulations have already been implemented.

o These findings are relevant in the face of today's increasingly stringent EU limits on car emission and driving bans.

APPENDIX

Variables

Table 1. Overview variables

Variable	Description	Source
A. Dependent variables in main specifications		
Interest rate	Current interest rate (%)	EDW
Loan term	Original contractual term	EDW
Loan-to-value	Original loan amount over car value	EDW
In arrears	Indicator variable equal to 1 if the borrower has ever been in arrears on the loan	EDW
B. Other loan characteristics		
Down payment	Amount of deposit/down payment at origination	EDW
Car value	Car value at origination	EDW
C. Explanatory variables: Bank characteristics		
Firm size	Log of total firm assets	FitchConnect
Market-to-book ratio	The ratio of the market value of assets to the book value of assets	FitchConnect
Tangibility	The ratio of tangible assets to total assets (multiplied by 100)	FitchConnect
Leverage	The ratio of total debt to total assets (multiplied by 100)	FitchConnect
Profitability	The return on equity	FitchConnect
D. Explanatory variables: Borrower characteristics		
Region	The region where the borrower is located at loan origination	EDW
Primary income	Primary borrower underwritten gross annual income	EDW
Employment status	Different dummies indicating the employment status of borrower (employed, self-employed, student, pensioner, unemployed)	
E. Explanatory variables: Car characteristics		
Brand	Brand name of car	EDW
Model	Model of car	EDW
Car classification	As defined by the European Commission	EDW
Used car	Indicator that equals 1 if the car was used at the time of origination	EDW

Summary statistics diesel emission scandal

Table 3. Summary statistics pre and post diesel emission scandal, diesel vs. petrol

This table reports the average loan characteristics in both periods, pre-and post the brand-specific diesel emission scandal for both diesel and petrol car loans provided by captive and independent banks. A t-test is used to identify statistically significant differences across the pre and post sub-periods. The left side of the table reports the characteristics for loans that have diesel cars underlying while the right side describes the average loan characteristics for loans that have petrol cars underlying. The sub-periods consist of one year before September 2015 and respectively one year after the brand-specific diesel emission scandal event.

| | diesel | | | | | | petrol | | | | | |
| | pre | | post | | Δ | | pre | | post | | Δ | |
Loan characteristics	mean	sd	mean	sd	b	t	mean	sd	mean	sd	b	t
Interest rate	7.65	2.2	6.75	2.31	0.90***	(71.1)	6.46	2.19	5.96	2.32	0.50***	(23.69)
Loan term	54.06	16.01	55.39	16.09	-1.33***	(-14.74)	54.36	19.61	55.4	18.36	-1.04***	(-5.83)
LTV	60.49	34.6	64.91	34.08	-4.42***	(-22.98)	75	33.49	71.66	33.52	3.34***	(10.61)
Down payment amount	6654.51	6106.8	6149.16	5950.25	505.36***	(14.97)	4239.85	4561.37	4968.49	5111.56	-728.64***	(-16.00)
Observations	72611		56583		129194		22477		22749		45226	

Table 4. Summary statistics pre and post the diesel emission scandal, captive vs. independent banks

This table reports the average loan characteristics in both periods, pre-and post the brand-specific diesel emission scandal for diesel car loans provided by captive and independent banks. A t-test is used to identify statistically significant differences across the pre and post sub-periods. The left side of the table reports the characteristics for loans provided by captive banks while the right side describes the average loan characteristics for loans provided by independent banks. The sub-periods consist of one year before September 2015 and respectively one year after the brand-specific diesel emission scandal event.

| | captive banks | | | | | | independent banks | | | | | |
| | pre | | post | | Δ | | pre | | post | | Δ | |
Loan characteristics	mean	sd	mean	sd	b	t	mean	sd	mean	sd	b	t
Interest rate	8.29	1.91	7.26	2.23	1.03***	-76.04	5.61	1.78	5.21	1.79	0.40***	(19.62)
Loan term	52.98	13.83	54.12	13.38	-1.15***	(-13.14)	57.56	21.2	59.23	21.95	-1.66***	(-6.77)
LTV	51.29	31.44	55.97	31.17	-4.68***	(-23.21)	90.15	26.81	92.08	27.5	-1.93***	(-6.24)
Down payment amount	7704.37	6226.52	7115.55	6124.43	588.81***	-14.81	3268.99	4185.25	3211.67	4188.88	57.31	(1.20)
Observations	55424		42576		98000		17187		14007		31194	

Summary statistics pre and post the introduction of low emission zone

Table 9. Summary statistics pre and post the introduction of low emission zones

This table reports the average loan characteristics in both periods, pre-and post the district-specific introduction of low emission zones in Germany. A t-test is used to identify statistically significant differences across the pre and post sub-periods. The sub-periods consist of 2 years before the introduction of the low-emission zones and respectively two years after.

	Pre		Post		Δ	
	mean	sd	mean	sd	b	t
Interest rate	5.99	1.54	6.09	1.51	-0.09**	(-3.17)
Loan term	58.7	20.15	57.7	20.91	1.00*	-2.51
Loan-to-value	87.06	28.47	87.03	28.93	0.03	-0.05
Down payment amount	3088.96	3961.31	3111.88	3944.56	-22.93	(-0.30)
Car valuation	11738.4	4084.37	11651.58	4195.8	86.83	-0.62
Observations	4275		6803		11078	

Passenger cars by age, 2021 (i.e. on 31 December 2021)
(% of all passenger cars)
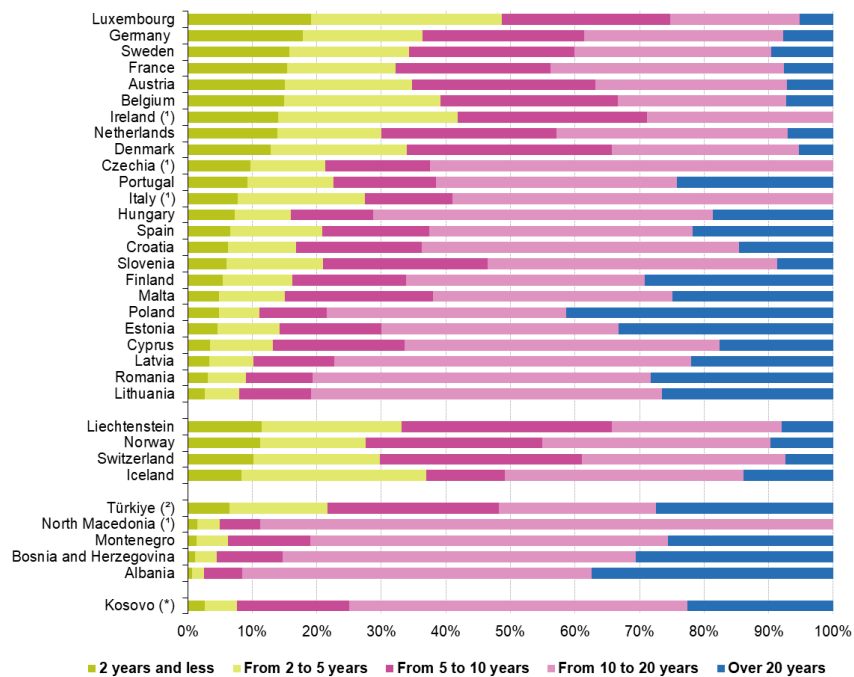
Note: Ranked by category '2 years and less'
Note: Bulgaria, Greece, Slovakia and Serbia: data not available.
(¹) The category 'From 10 to 20 years' also includes category 'Over 20 years'.
(²) 2020 data instead of 2021.
(*) This designation is without prejudice to positions on status, and is in line
with UNSCR 1244/99 and the ICJ Opinion on the Kosovo Declaration of Independence.
Source: Eurostat (online data code: road_eqs_carage)

eurostat

Findings from the GAS project

Max Riedel

(Leibniz Institute for Financial Research SAFE)

14:20 – 14:35

The Green Auto Securitisation (GAS) Project

LEIBNIZ INSTITUTE

S A F E

Sustainable Architecture
for Finance in Europe

The European Green Deal

- The EU aims to be climate-neutral by 2050
    - → Economy with net-zero greenhouse gas emissions

- How to achieve this goal?
    - ➤ Creation of right incentives
    - ➤ Mobilization of private and public investments
    - ➤ Development of tailored financial instruments

What is the GAS project?

- Focus:
  - securitisation of green auto loans and leases
- Relevance:
  - a green finance mechanism is needed to incentivize purchase of low-emission vehicles via captive and non-captive banks
- Challenges:
  - ESG information disclosure requirements are underdeveloped for green securitisation products
  - lack of harmonization due to ongoing regulatory framework discussions
  - data availability issues

GAS project in a nutshell

GAS
Project

deliverables

Development of a model **database** with
four building blocks:

(i) the sustainability characteristics of the **car manufacturers**
(ii) the characteristics of **car models**
(iii) information on car **loans** (and **leases**)
(iv) the characteristics of **securitisation products**.

Analysis and **definition** of automobile-related transparent
sustainability factors at the level of the
  - car manufacturer
  - supply chain
  - automobile

Investigation of the relationship between **low-emission
vehicles** and **credit risk**

Suggestions for a design of two new green financial products:

1) Green Auto Loans and Leasing Contracts
2) Green Auto and Leasing ABS

Literature

- Definition of "Green"
  - How to define a green securitisation (Petit and Schlosser, 2020)?
  - EBA: Framework for sustainable securitisation (EBA, 2022)
  - Banque de France: How to measure the carbon impact of eligible Auto ABS (Andre et al, 2022)?

- Securitisation in the sustainability context
  - Bena et al (2023) document an "electric vehicle financing gap"
  - Banca d'Italia: Analysis of green securitisations in Italy (Cusano et al, 2023)
  - Latino, Pelizzon and Riedel (2023) review the literature on green securitisation

Century-old idea of green, with a low-uptake

1888
The Flocken Elektrowagen is designed, regarded as the first "real" electric vehicle

1873
The first working electric road vehicle is built in the UK

1827- 1839
Early rudimentary electric motors were constructed

1900-1912
Electric cars accounted for one third of all vehicles on the road

1973
First Symposium on Low Pollution Power System Development

1996
General Motors releases the EV1

2010
General Motors releases the first plug-in hybrid

2006
Tesla takes on electric cars

1899
First Hybrid car is invented

1971
Electromecanical transmission

1997
The first mass-produced hybrid car is introduced: the Toyota Prius

1889
William H. Patton patents the first gasoline-electric hybrid rail-car propulsion system

1974-79
Sebring-Vanguard's CitiCar is the leader of the Electric Vehicles

2010
new battery technologies are being developed

How to define a Green Auto ABS?

Auto ABS

How to define a Green Auto ABS?

Auto ABS

?
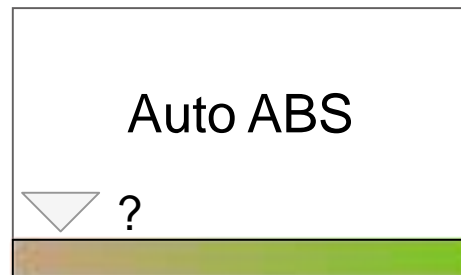
Apply the Use of Proceeds approach?

Commitment to finance green project in the future

Auto ABS

Future loan

Use of Proceeds
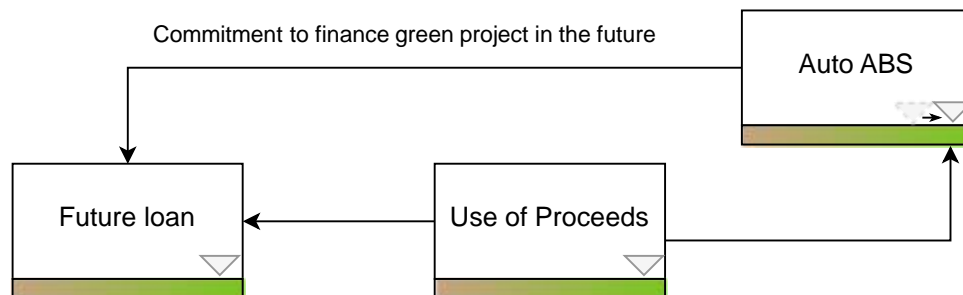
Or use the collateral?

Commitment to finance green project in the future

Future loan

Use of Proceeds

Auto ABS

Auto loan 1

Auto loan N
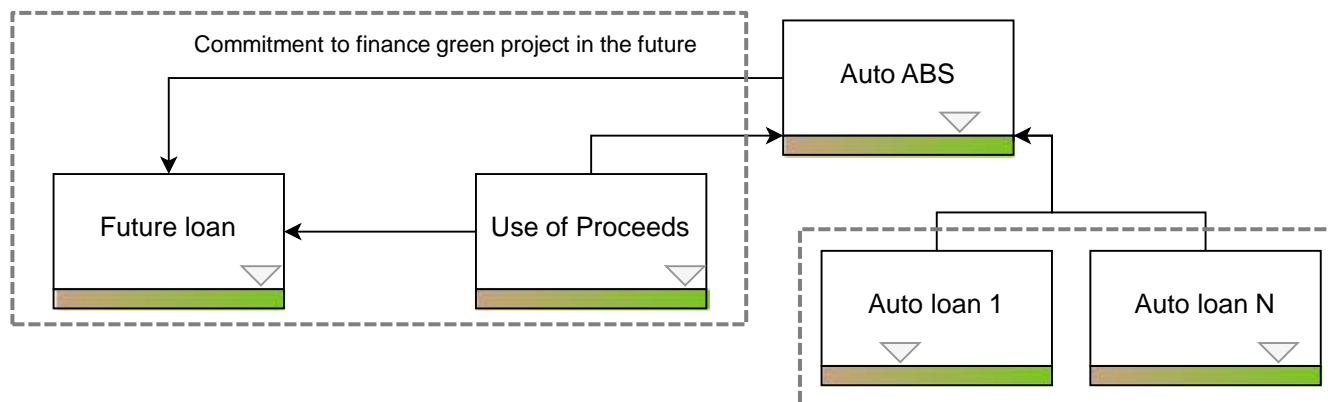
How to label under the collateral-based approach?
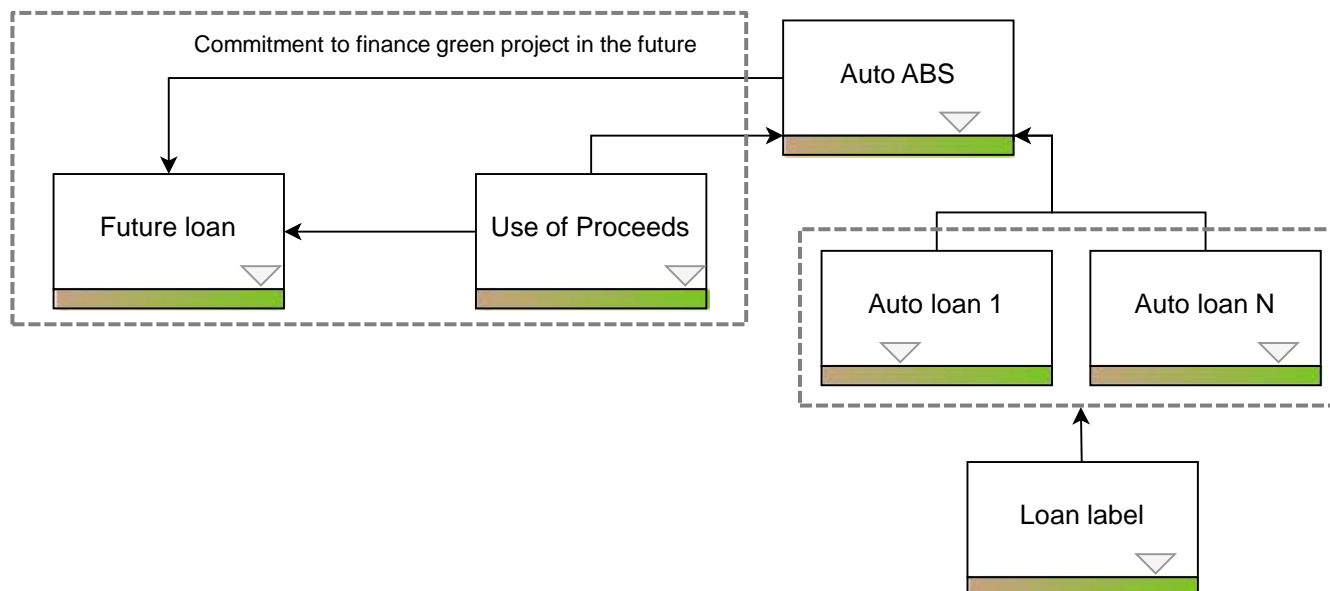
Use manufacturer- or vehicle-level information, or both?
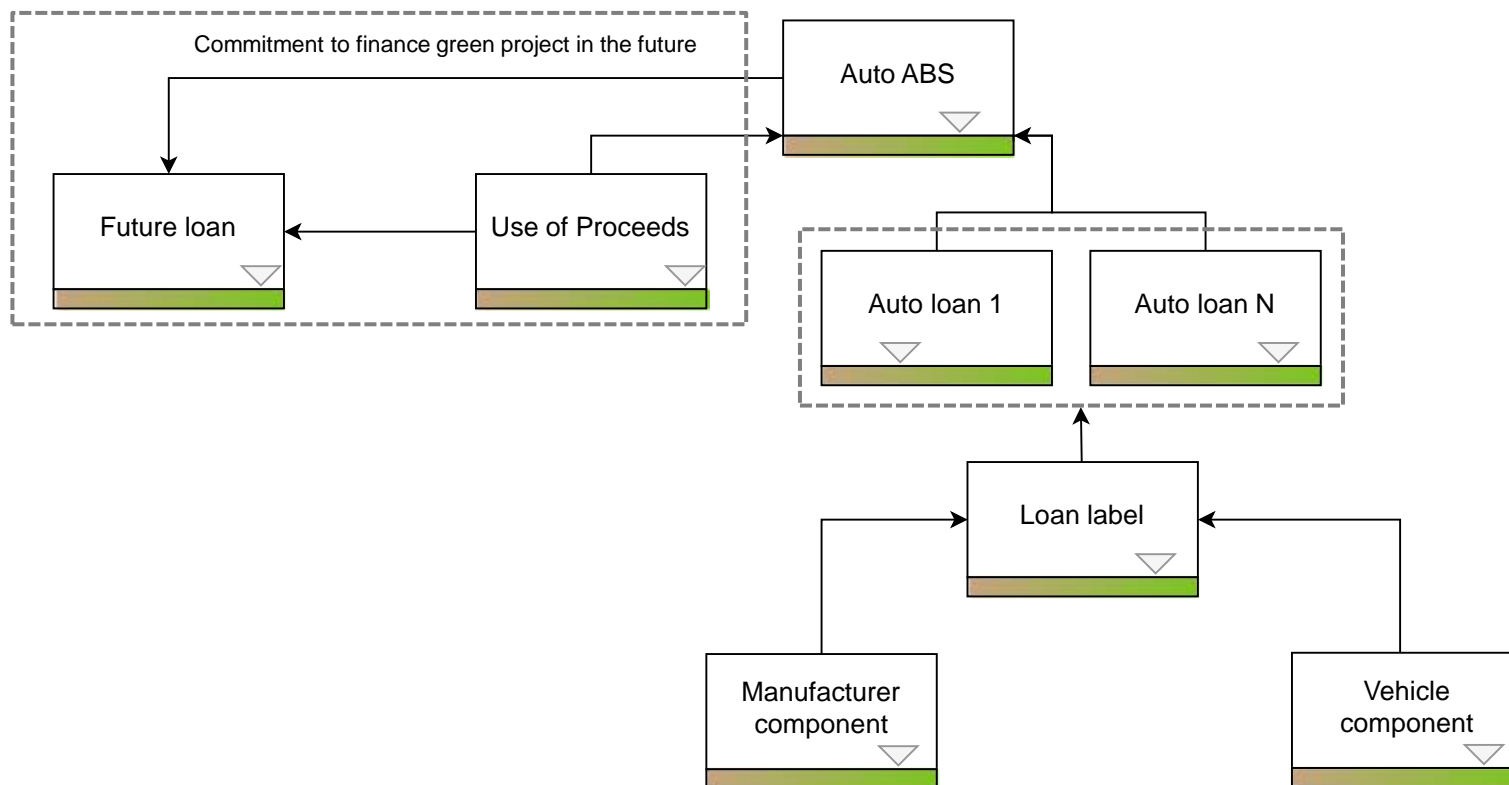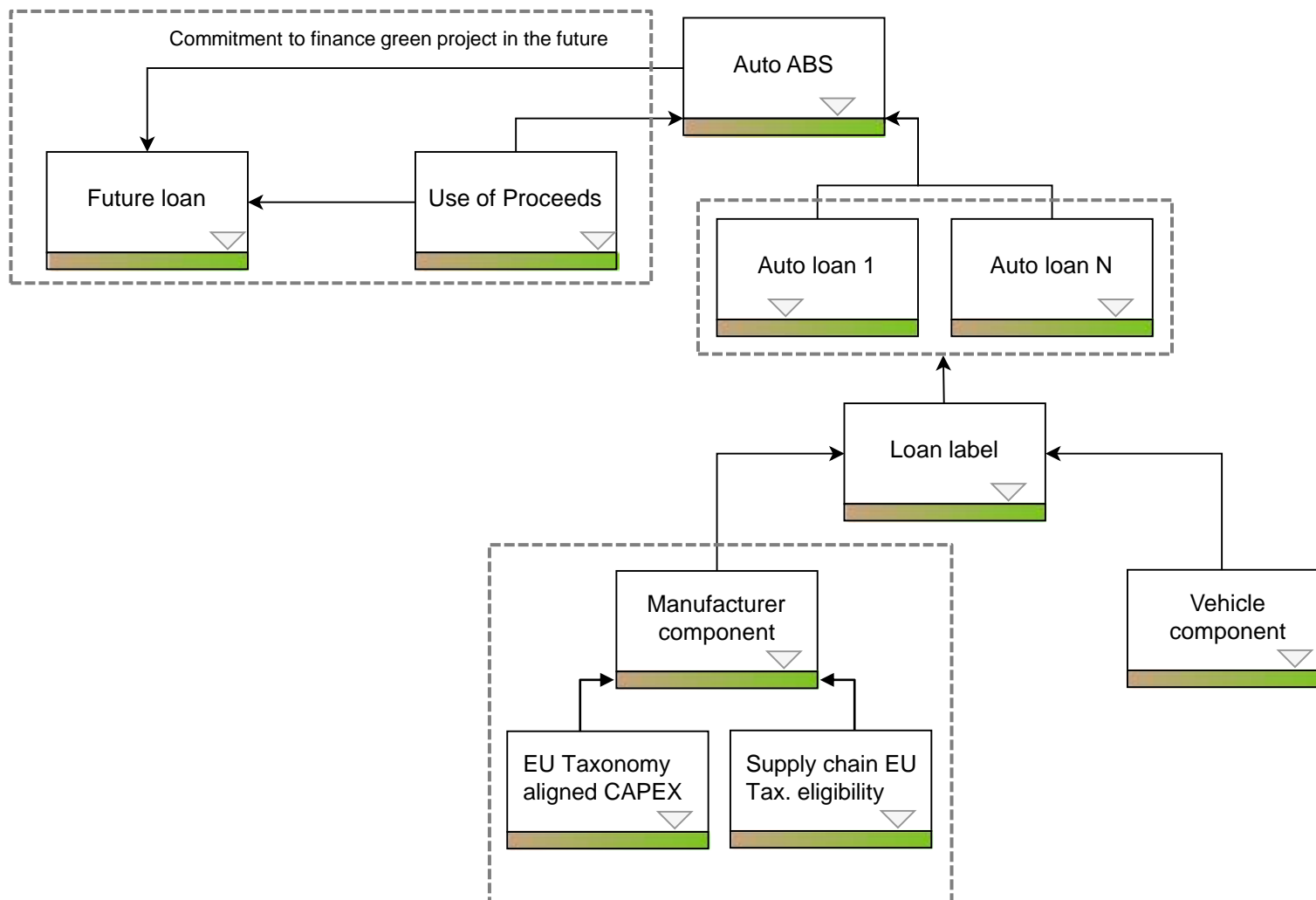
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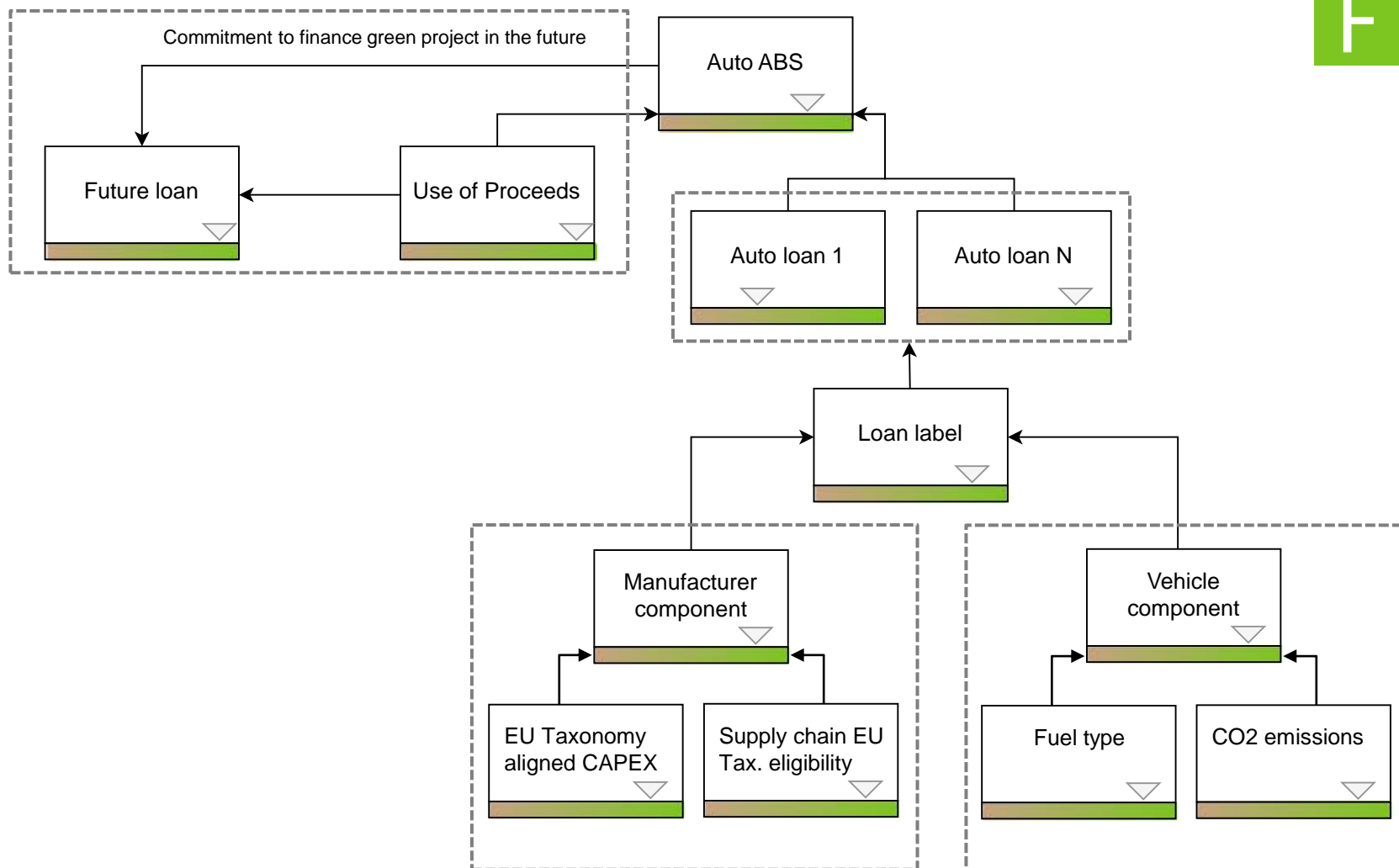
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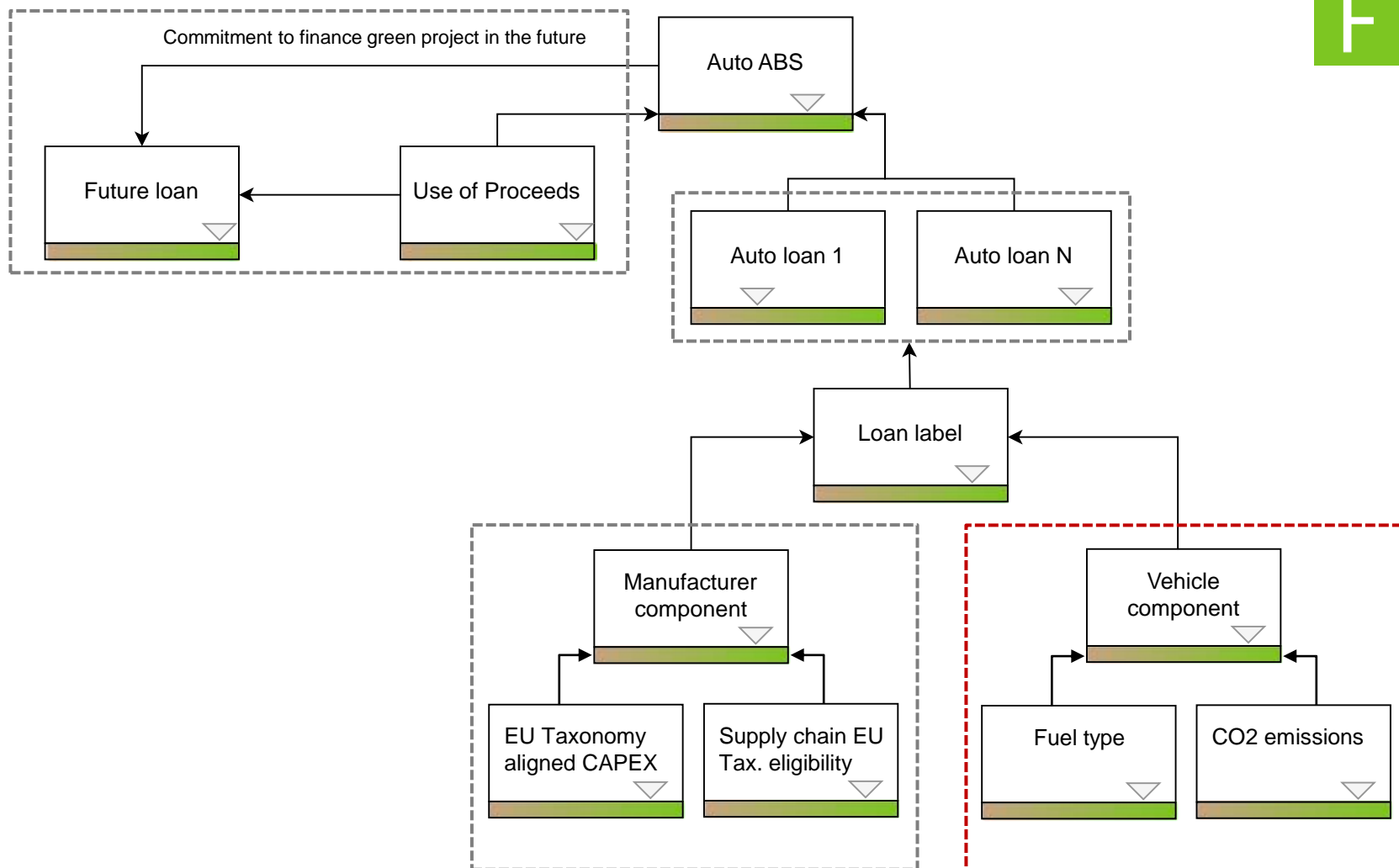
Vehicle-related prospectus-level information

In ABS prospectuses, we can find tables on:

- Fuel type
- Euro emissions standards
- CO2 emissions
- EPC information

Screenshots from selected prospectuses:

14. *Engine Type*

Distribution by Engine Type	Number of contracts	Percentage of contracts	Outstanding discounted balance	Percentage of Outstanding discounted balance
Petrol	38,312	67.1%	624,504,796.83 €	59.0%
Petrol/Hybrid	1,819	3.2%	52,118,858.26 €	4.9%
Diesel	7,089	12.4%	115,355,928.56 €	10.9%
Diesel/Hybrid	38	0.1%	675,382.60 €	0.1%
Electric	9,855	17.3%	265,770,114.66 €	25.1%
CNG/LPG	3	0.0%	126,738.56 €	0.0%
Other	3	0.0%	64,778.58 €	0.0%
Total	57,119	100.00%	1,058,616,598.05 €	100.00%

28. **CO2 EMISSIONS**

CO2 Emissions	Current Balance	% of Current Balance	# of Loans	% of Loans	Weighted Average Interest Rate	WA Remaining Term	WA Seasoning
[0 - 25)	6,616.19	0.00%	1	0.00%	0.07	42.93	5.07
[25 - 50)	704,217.75	0.15%	26	0.12%	0.03	64.52	4.73
[50 - 75)	333,207.47	0.07%	18	0.08%	0.03	56.03	4.61
[75 - 100)	17,645,574.35	3.82%	1,189	5.59%	0.04	56.99	5.97
[100 - 125)	72,132,677.85	15.60%	4,765	22.40%	0.04	58.44	5.89
[125 - 150)	79,825,762.19	17.26%	4,599	21.62%	0.04	59.92	5.46

2.25 Distribution by Emission Class

Distribution by Emission Class	Number	% of Number	Outstanding (EUR)	% of Outstanding
Euro 6	62,923	71.11%	802,764,696.17	80.28%
Euro 5	22,521	25.45%	183,335,622.71	18.33%
Euro 4	3,019	3.41%	13,725,139.81	1.37%
EEV	12	0.01%	113,423.38	0.01%
Euro 3	17	0.02%	61,117.90	0.01%
Total	88,492	100.00%	999,999,999.97	100.00%

Fuel type tabulation in offering prospectuses
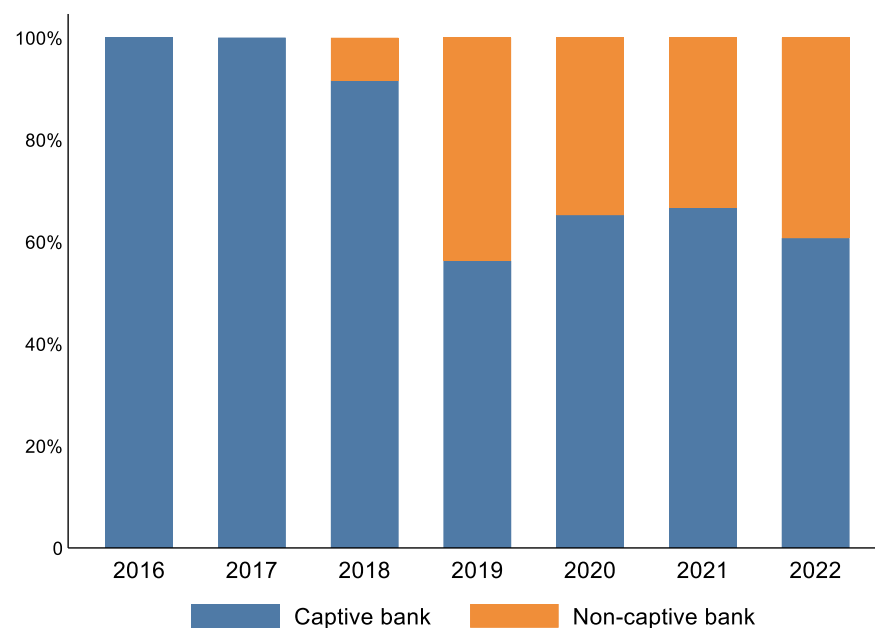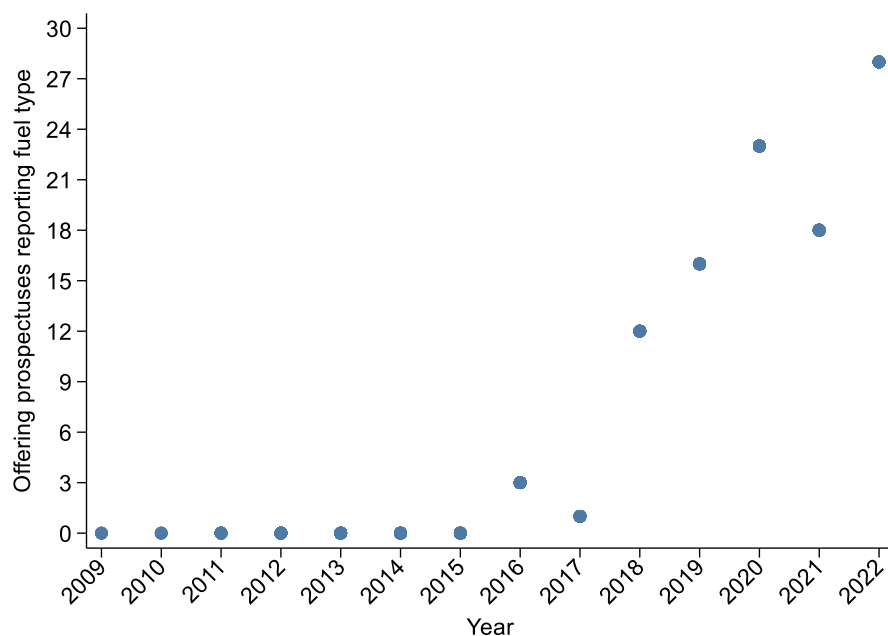
- Number of ABS with fuel-type tables increased since 2016 (lhs)
- Both types of issuers collect fuel information (rhs)

Share of LEVs (EVs + PHEVs) in the asset pool
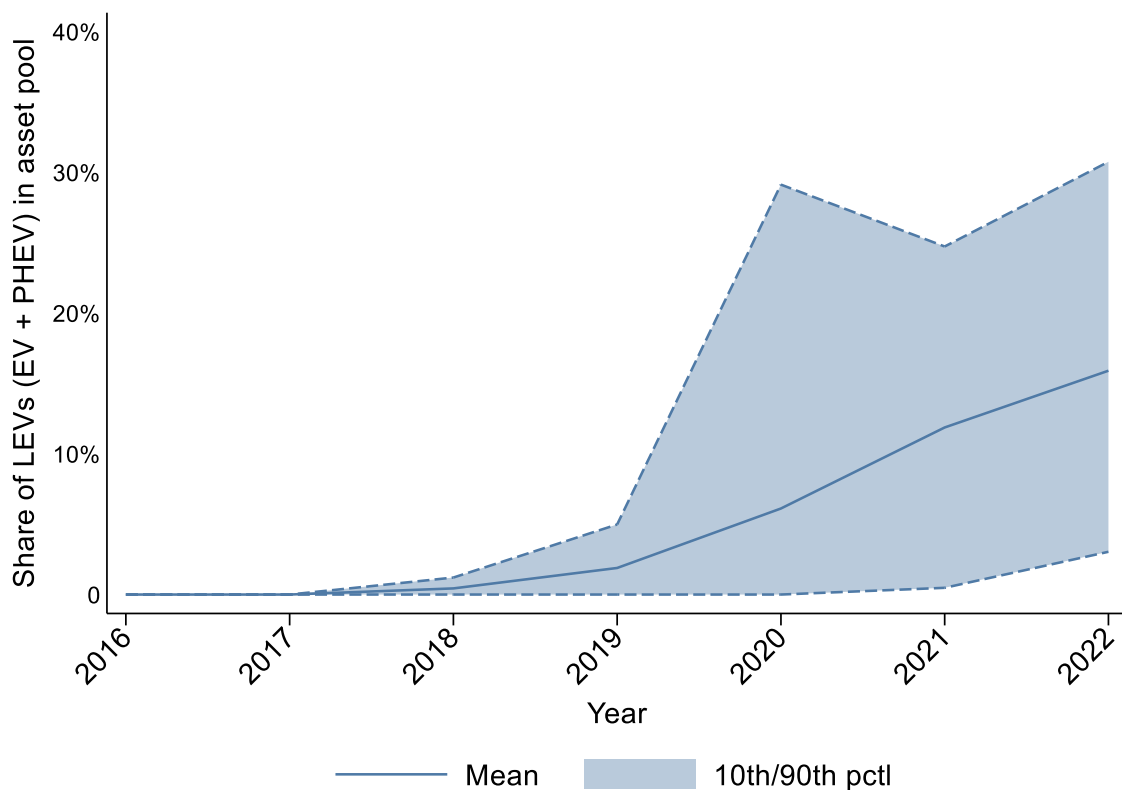
- Share of low-emission vehicles in the ABS collateral pool is steadily increasing, reaching up to 30%

What about manufacturer-level information?
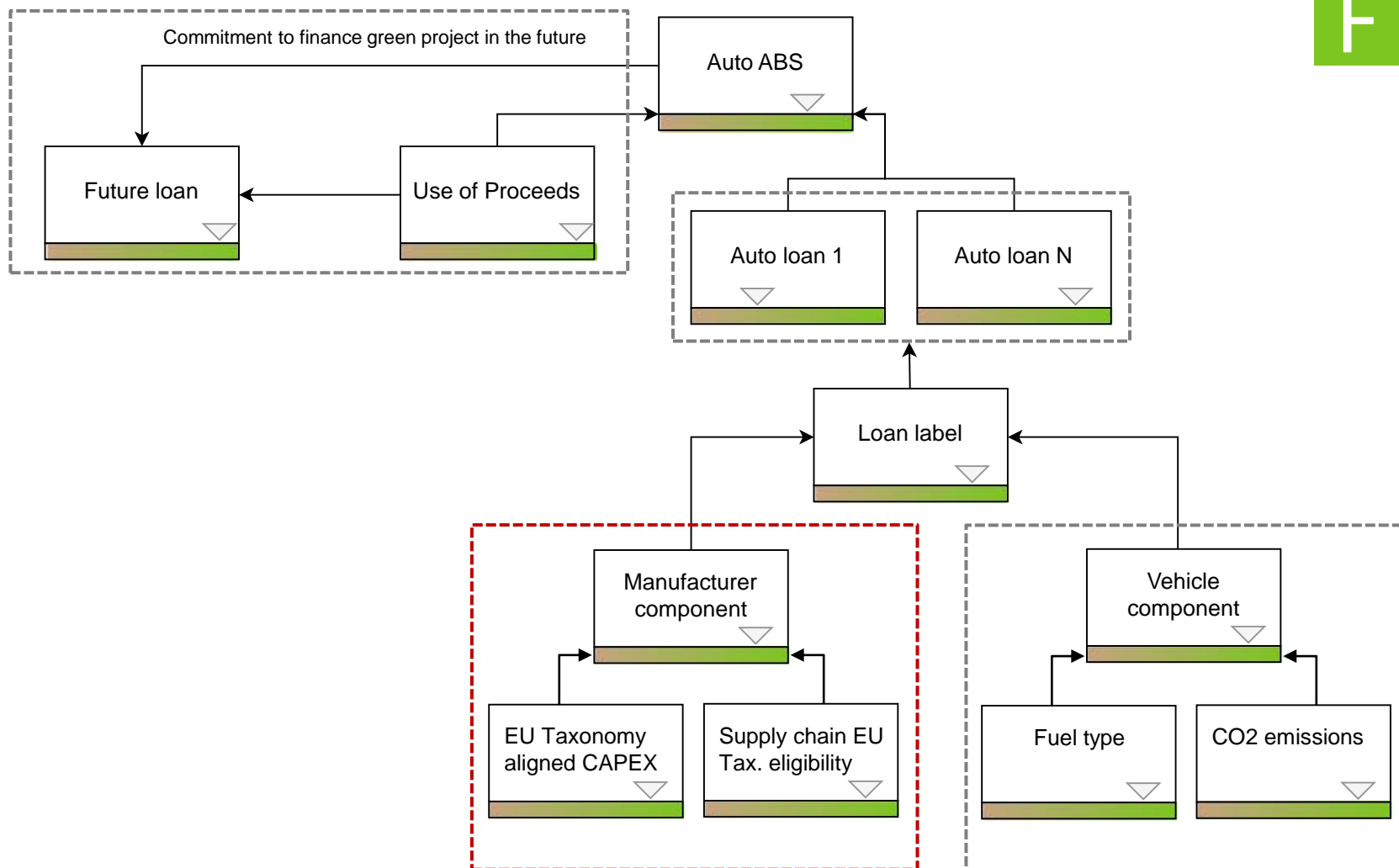
Challenge: how to deal with M&As in the auto industry?

On 16 January 2021, Opel was sold to Stellantis following the merger of PSA Group with Fiat Chrysler Automobiles.

In March 1929, General Motors bought 80% of the company

In 2017, PSA Group bought Opel
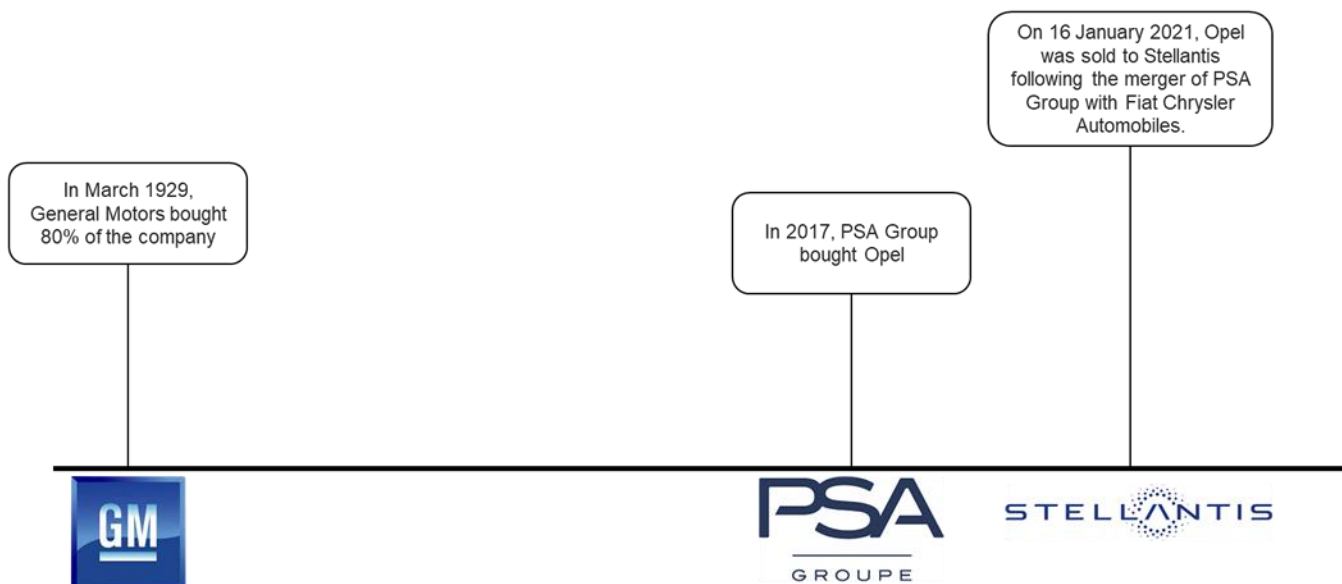
Our approach: use the parent company's information in the year of ABS issuance

Manufacturer-level information
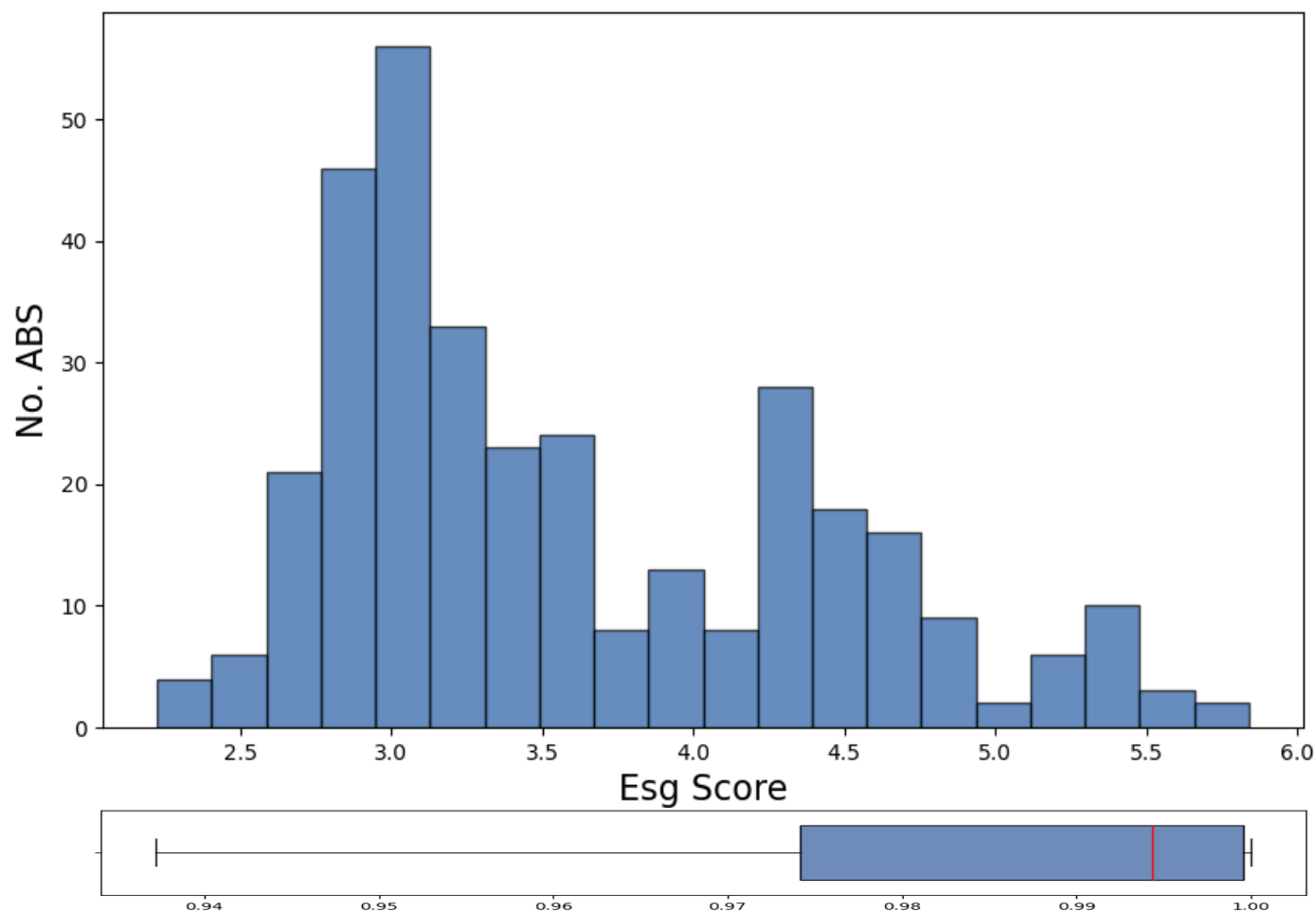
Is there any investor demand for Green Auto ABS?

© Disney
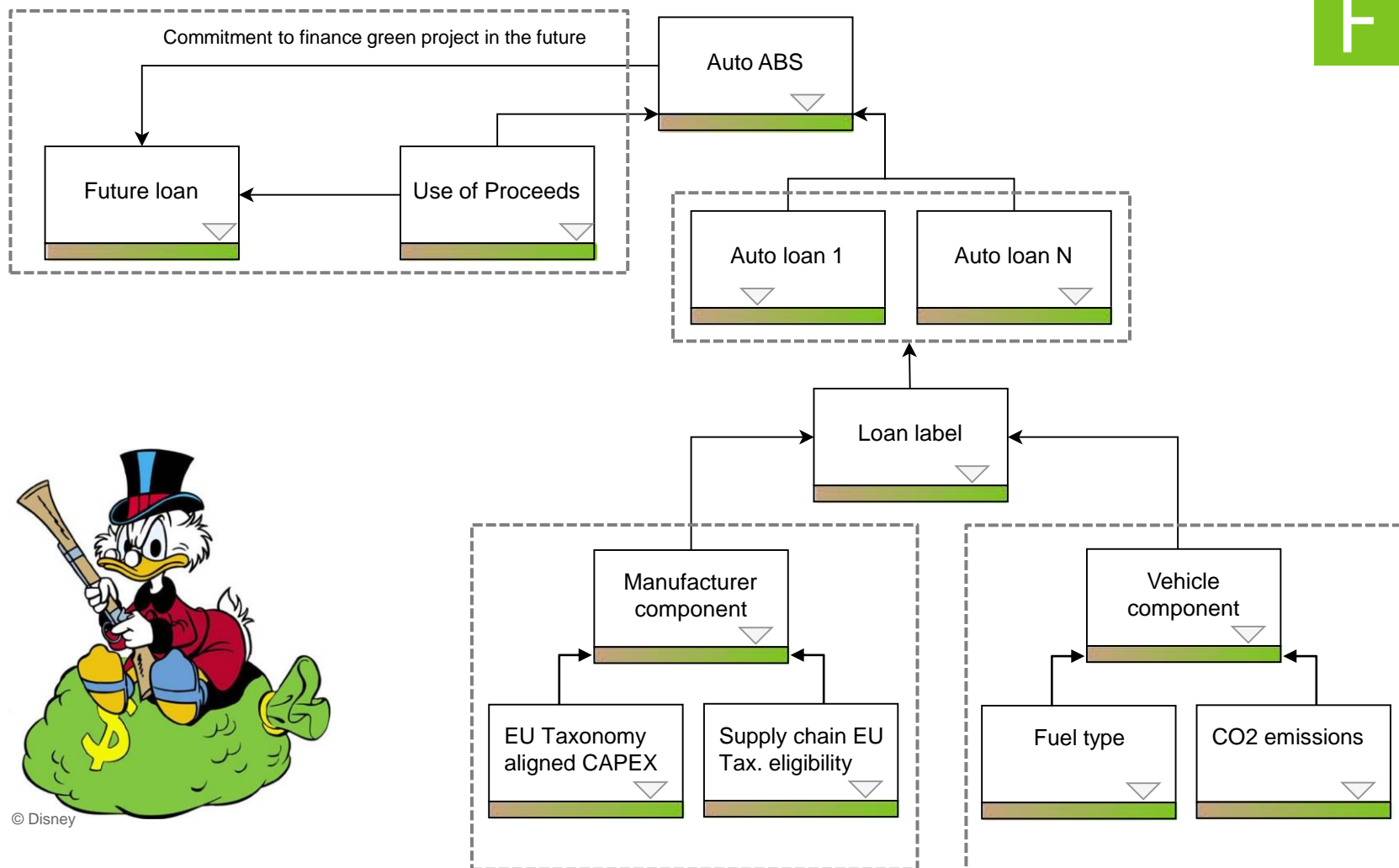
Is there any investor demand for Green Auto ABS?

- 454 funds

- Period: Q4 2013 and Q4 2022

- Average size: EUR 1.5 billion

- 23% of funds have an above average Morningstar ESG score

Is there any investor demand for Green Auto ABS?

Share of ABS tranche held by mutual fund industry
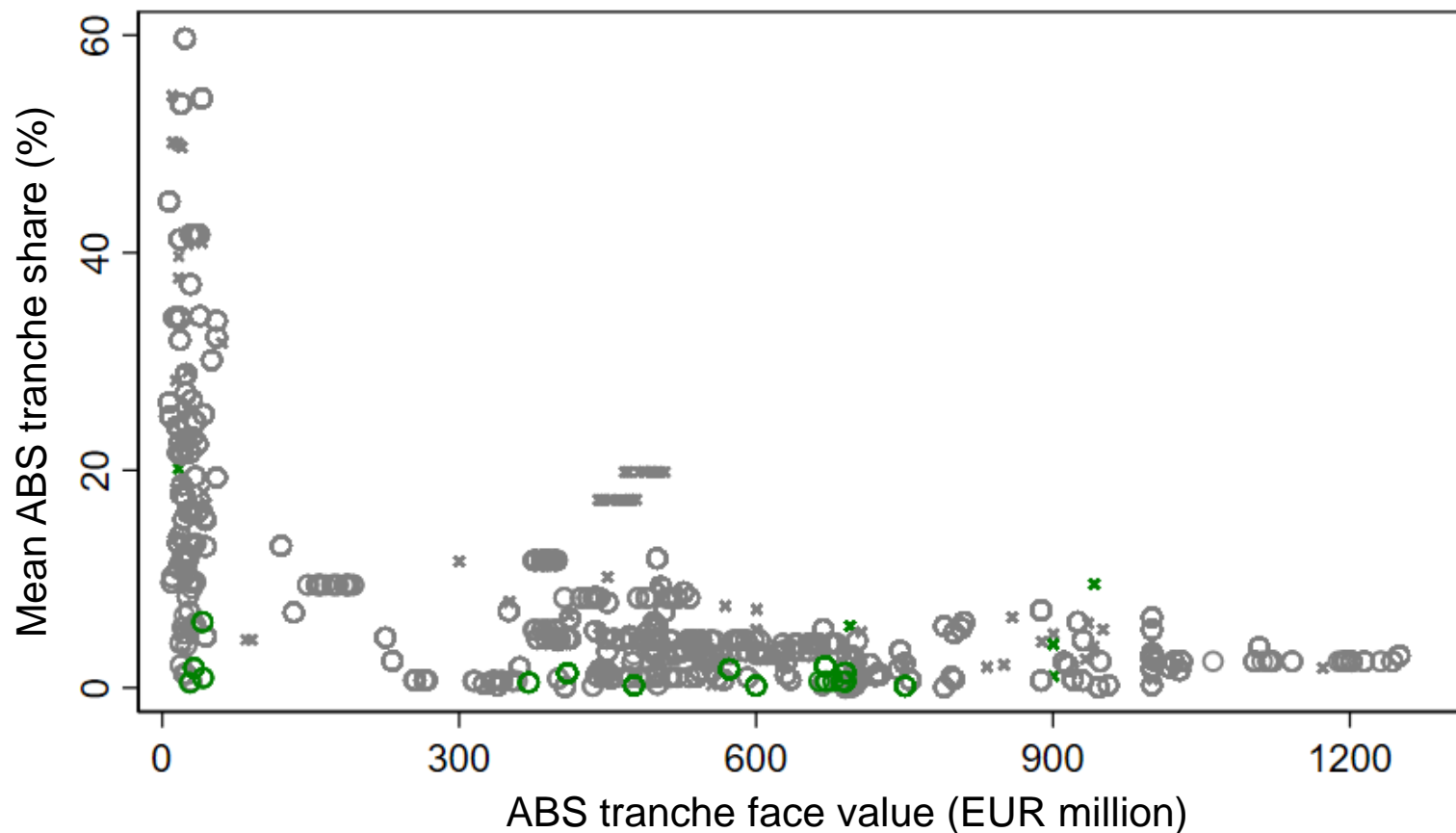
Is there any investor demand for Green Auto ABS?

Share of ABS tranche held by mutual fund industry
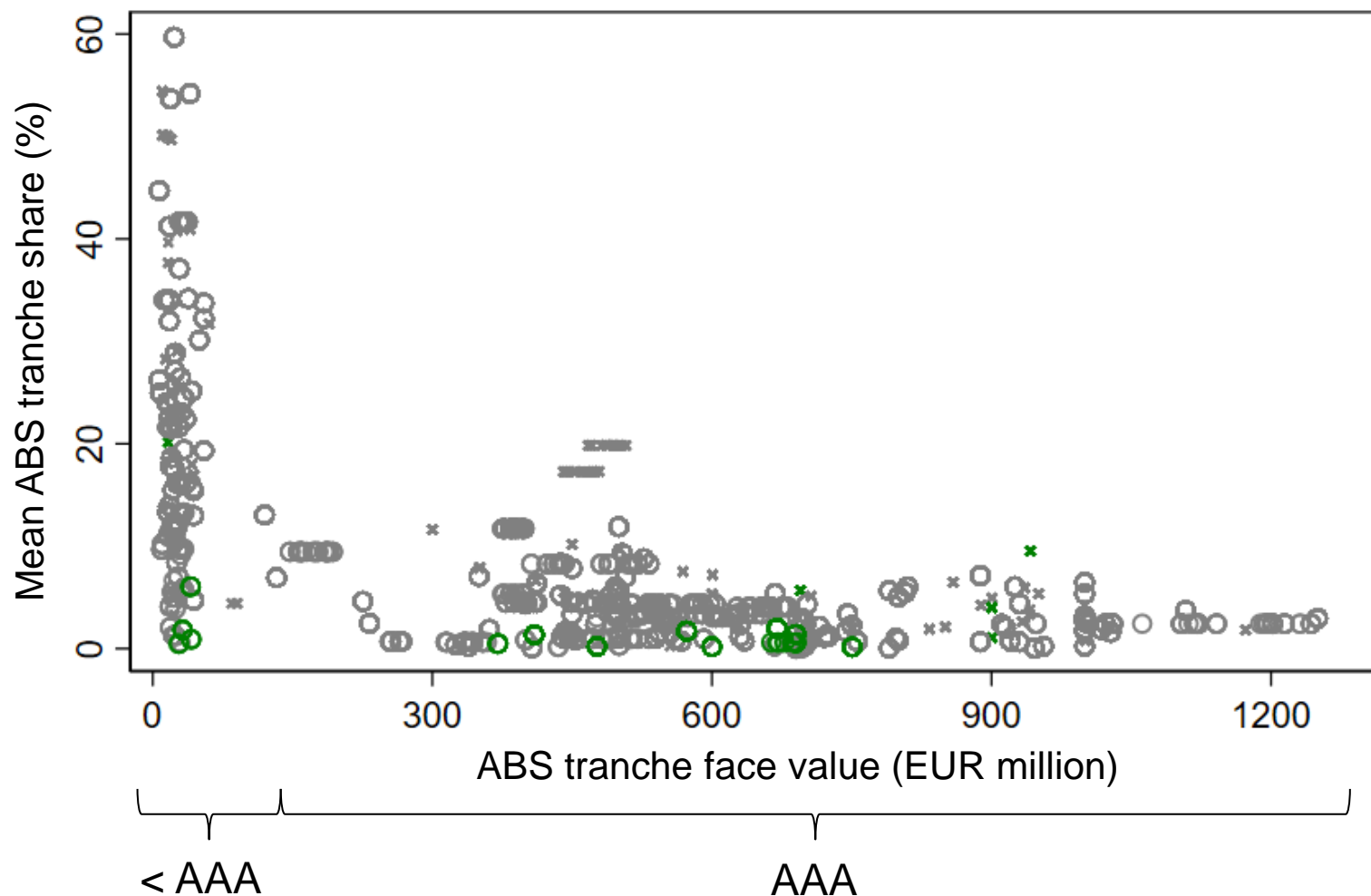
Is there any investor demand for Green Auto ABS?

Proportion of fuel type-reporting Auto ABS in fund portfolios

x – fund with above average ESG score
x – fund with below average ESG score
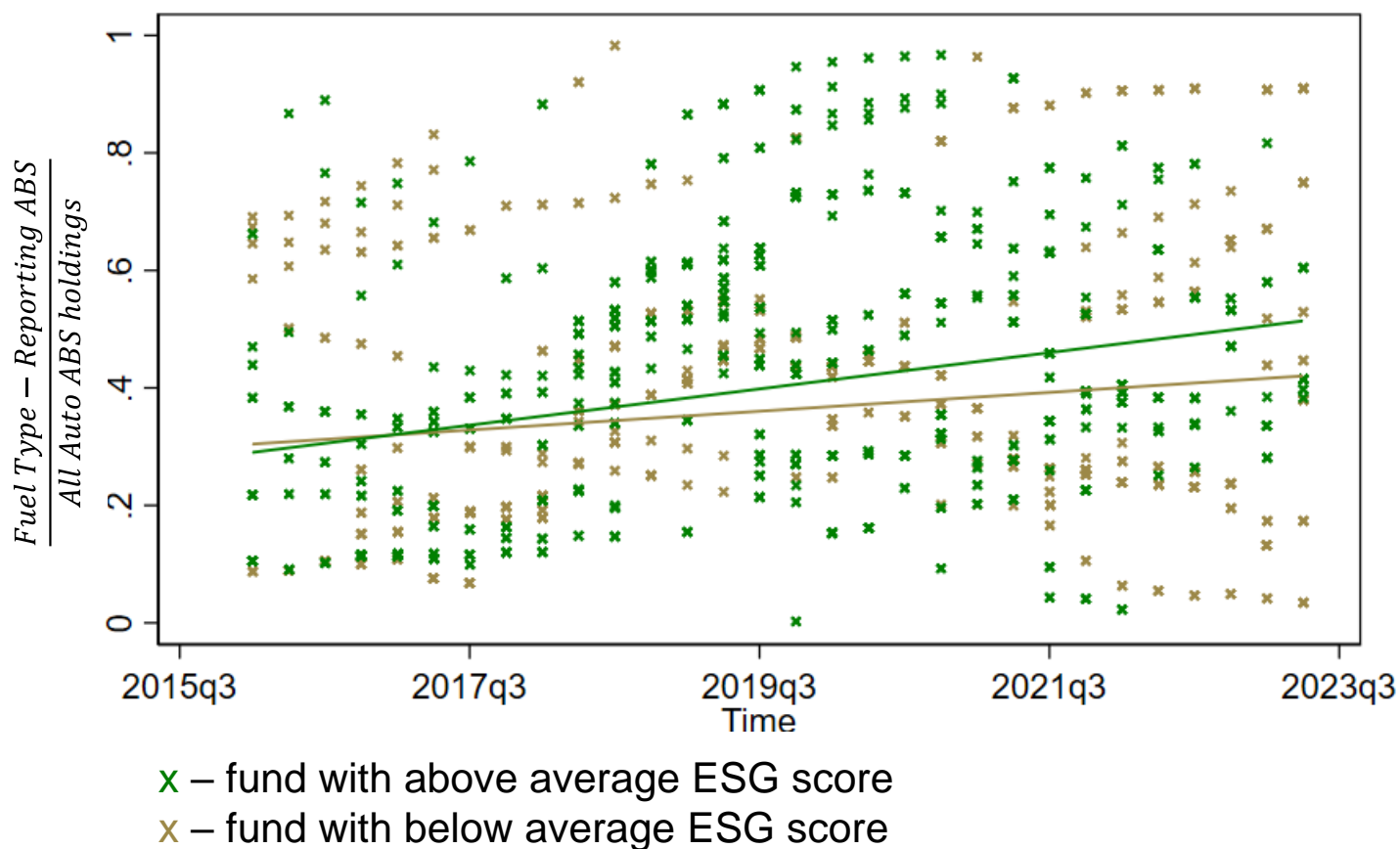
The way forward

- Does manufacturer-level information matter?

- What types of investors are more prone to invest (Green) Auto ABS?

- Is the green component related to credit risk at the loan level?

GAS team

Prof. Loriana Pelizzon, Ph.D.
Leader, subproject 1

Marco Angheben
Leader, subproject 2

Max Riedel, Ph.D.
Senior researcher

Carmelo Latino
Junior researcher

Andrea Bedin
Project Manager

Usman Jamil
Project Manager

Yue Wang
Junior researcher

Luisa Faust
Student assistant

Maxime Fouchardiere
Project Member

Evidence from Auto ABS data

Andrea Bedin and Usman Jamil

(European DataWarehouse)

14:35 – 14:50

EVIDENCE FROM AUTO ABS DATA

8 NOVEMBER 2023

ANDREA BEDIN

USMAN JAMIL

NUMBER OF PUBLIC DEALS REPORTING TO ESMA

- 155 Auto deals with ESMA submissions
- 17 Leasing deals with ESMA submissions
- 172 Total Auto and Leasing deals report ESMA
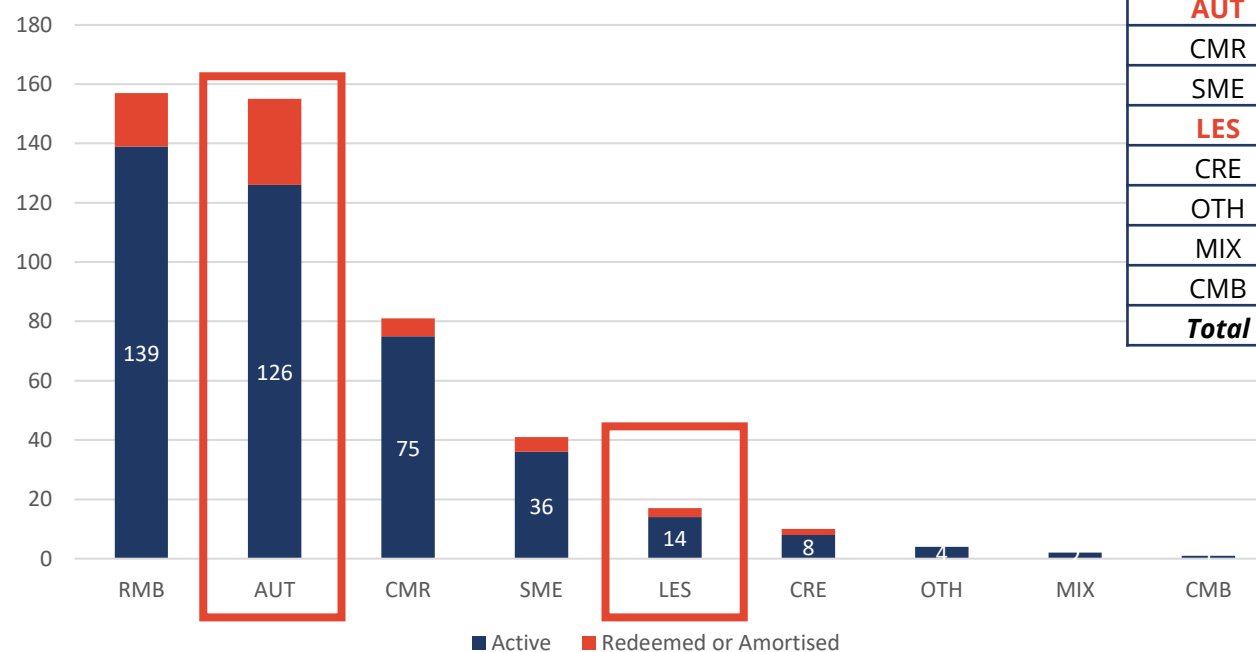
Asset Class	Active	Redeemed or Amortised	Total
RMB	139	18	157
AUT	**126**	**29**	**155**
CMR	75	6	81
SME	36	5	41
LES	**14**	**3**	**17**
CRE	8	2	10
OTH	4	0	4
MIX	2	0	2
CMB	1	0	1
Total	*405*	*63*	*468*

■ Active ■ Redeemed or Amortised

Source: European DataWarehouse data as of October 2023

AUTO & LEASE DEALS REPORTING ESMA – COUNTRY BREAKDOWN

Germany, Italy, Spain & France are biggest issuers of auto and leasing transactions under ESMA

Country	Active	Redeemed or Amortised	Total
Germany	56	18	74
Italy	22	5	27
Spain	19	2	21
France	17	2	19
Finland	8	1	9
United Kingdom	3	4	7
Netherlands	5	0	5
Portugal	4	0	4
Belgium	2	0	2
Austria	2	0	2
Poland	1	0	1
Ireland	1	0	1
Total	*140*	*32*	*172*

■ Active   ■ Redeemed or Amortised

Source: European DataWarehouse data as of October 2023
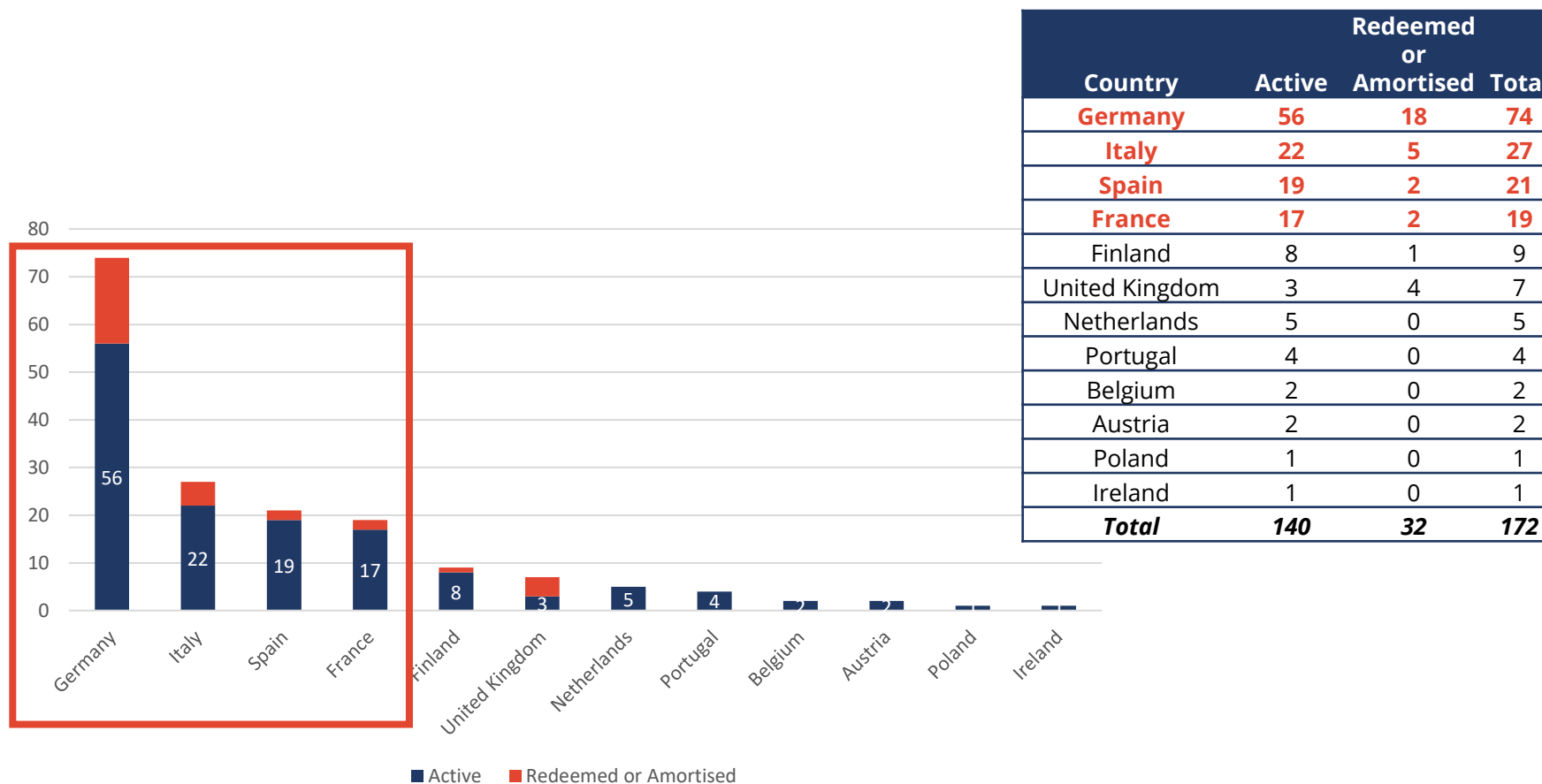
AUTO & LEASING DEALS REPORTING ESMA – VINTAGE BREAKDOWN

Auto deals have shorter maturity compared to other asset classes

Vintage	Active	Redeemed or Amortised	Total
2010	1	0	1
2011	1	0	1
2012	2	0	2
2014	1	0	1
2015	3	0	3
2016	1	3	4
2018	0	3	3
2019	13	17	30
2020	24	7	31
2021	35	2	37
2022	29	0	29
2023	30	0	30
Total	*140*	*32*	*172*

Source: European DataWarehouse data as of October 2023
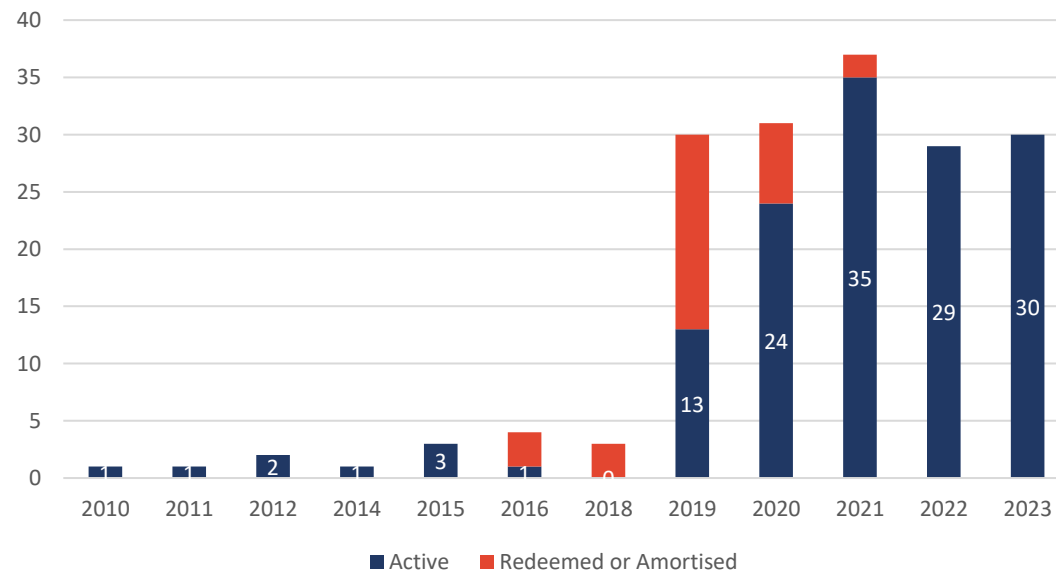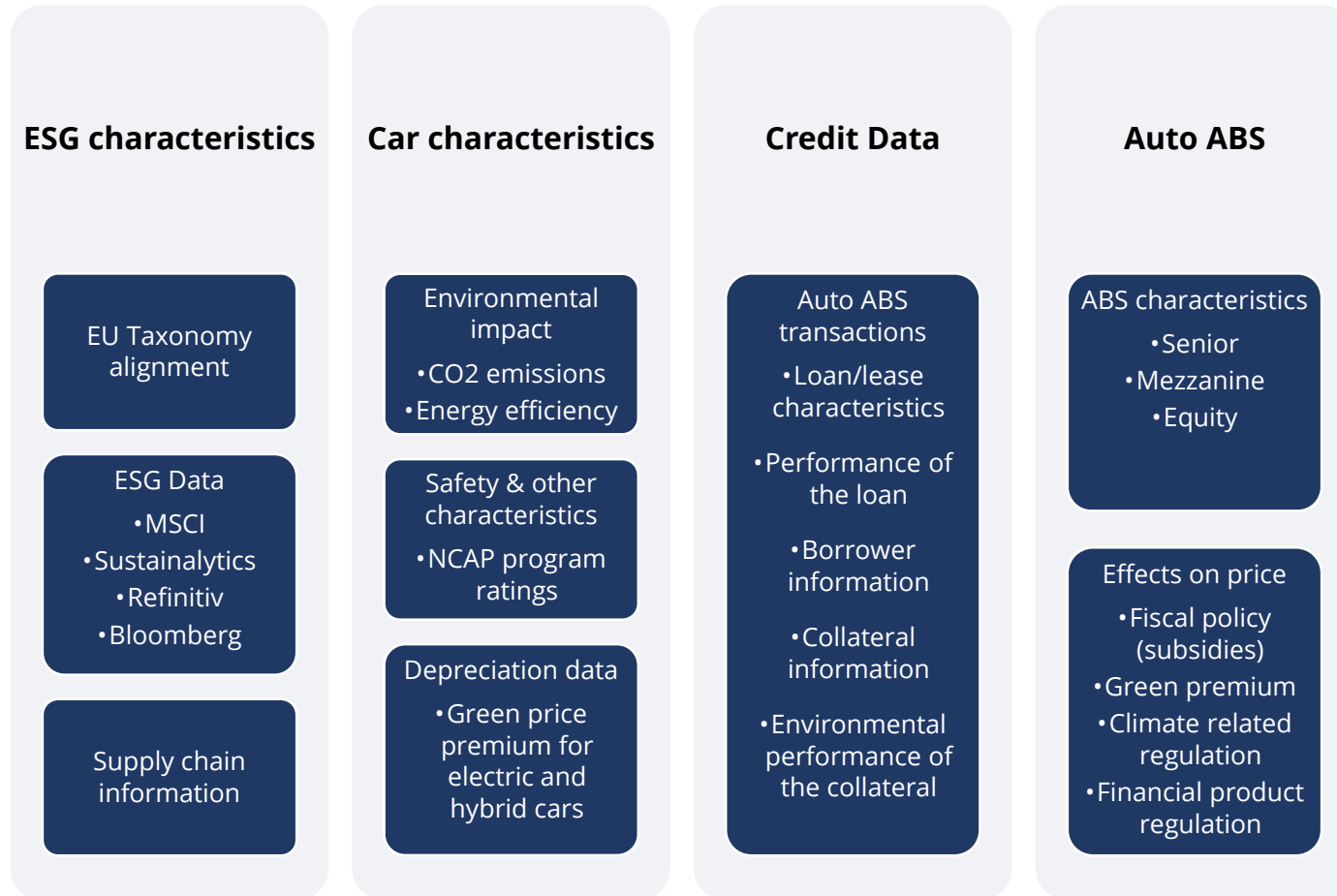
GAS FOUR-PILLARS SUSTAINABILITY DATABASE

Credit and Auto ABS Data

ESG characteristics

EU Taxonomy alignment

ESG Data
• MSCI
• Sustainalytics
• Refinitiv
• Bloomberg

Supply chain information

Car characteristics

Environmental impact
• CO2 emissions
• Energy efficiency

Safety & other characteristics
• NCAP program ratings

Depreciation data
• Green price premium for electric and hybrid cars

Credit Data

Auto ABS transactions
• **Loan/lease characteristics**
• **Performance of the loan**
• **Borrower information**
• **Collateral information**
• **Environmental performance of the collateral**

Auto ABS

ABS characteristics
• **Senior**
• **Mezzanine**
• **Equity**

Effects on price
• Fiscal policy (subsidies)
• Green premium
• Climate related regulation
• Financial product regulation

- EDW has been collecting data on ABS deals since 2013

- The analysis makes use of data collected under the ECB and ESMA regimes

- All available information on auto and leasing ABS deals issued in Germany, France, and Spain is being used for GAS

GAS FOUR-PILLARS SUSTAINABILITY DATABASE

Sustainability Data

ESG characteristics

EU Taxonomy alignment

ESG Data
• MSCI
• Sustainalytics
• Refinitiv
• Bloomberg

Supply chain information

Car characteristics

Environmental impact
• **CO2 emissions**
• **Energy efficiency**

Safety & other characteristics
• NCAP program ratings

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Credit Data

Auto ABS transactions

• Loan/lease characteristics
• Performance of the loan
• Borrower information
• Collateral information
• Environmental performance of the collateral

Auto ABS

ABS characteristics
• Senior
• Mezzanine
• Equity

Effects on price
• Fiscal policy (subsidies)
• Green premium
• Climate related regulation
• Financial product regulation

• Via ESMA templates, issuers can disclose information of cars' Energy Performance Certificates (EPCs).
• EPCs are not standardised across countries. Therefore we integrate the car level information with the EEA database.
• We retrieve information on the CO2 emissions for each specific car model.

ESMA DISCLOSURE REQUIREMENTS
The ESMA templates require issuers to disclose the EPC value, <u>if available</u>.

Car characteristics

Car characteristics

Environmental impact
- **CO2 emissions**
- **Energy efficiency**

Safety & other characteristics
- NCAP program ratings

Depreciation data
- Green price premium for electric and hybrid cars

FIELD CODE	FIELD NAME	CONTENT TO REPORT
		Underlying exposures information section
AUTL53	Manufacturer	Brand name of the vehicle manufacturer E.g. enter "Skoda", not "Volkswagen".
AUTL54	Model	Name of the car model.
AUTL55	Year Of Registration	Year the car was registered.
AUTL56	New Or Used	Condition of vehicle at point of underlying exposure origination: New (NEWX) Used (USED) Demo (DEMO) Other (OTHR)
AUTL57	Energy Performance Certificate Value	The energy performance certificate value of the collateral at the time of origination: A (EPCA) B (EPCB) C (EPCC) D (EPCD) E (EPCE) F (EPCF) G (EPCG) Other (OTHR)

Source: ESMA templates for Auto ABS

- The ESMA templates require issuers to disclose the Energy Performance Certificate value of cars, <u>if available</u>.

AVAILABLE ENERGY PERFORMANCE CERTIFICATES IN EDW
The percentage of auto loans and leases with a valid EPC is increasing

- The percentage of Auto loans and leases with a valid EPC is steadily increasing over time reaching 2.3 million in Q3 2023.
- The increasing trend is driven by cars with better EPC.
- We noticed an increasing trend from issuers to disclose EPC information and from investors to ask for sustainability related data.

Energy Performance Certificates Available per quarter

Evolution of reported EPCs over time
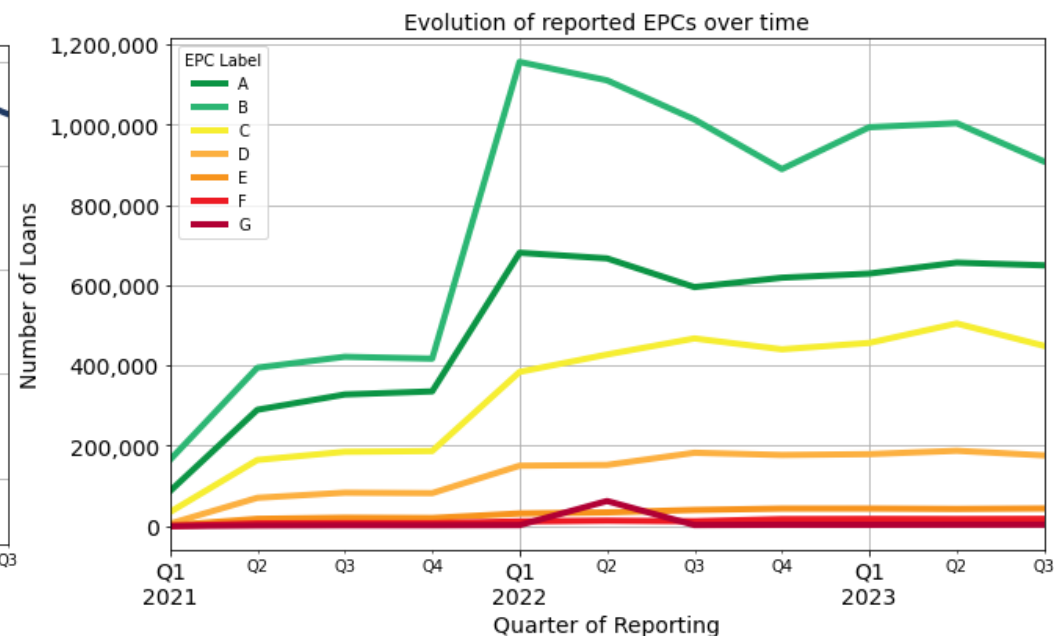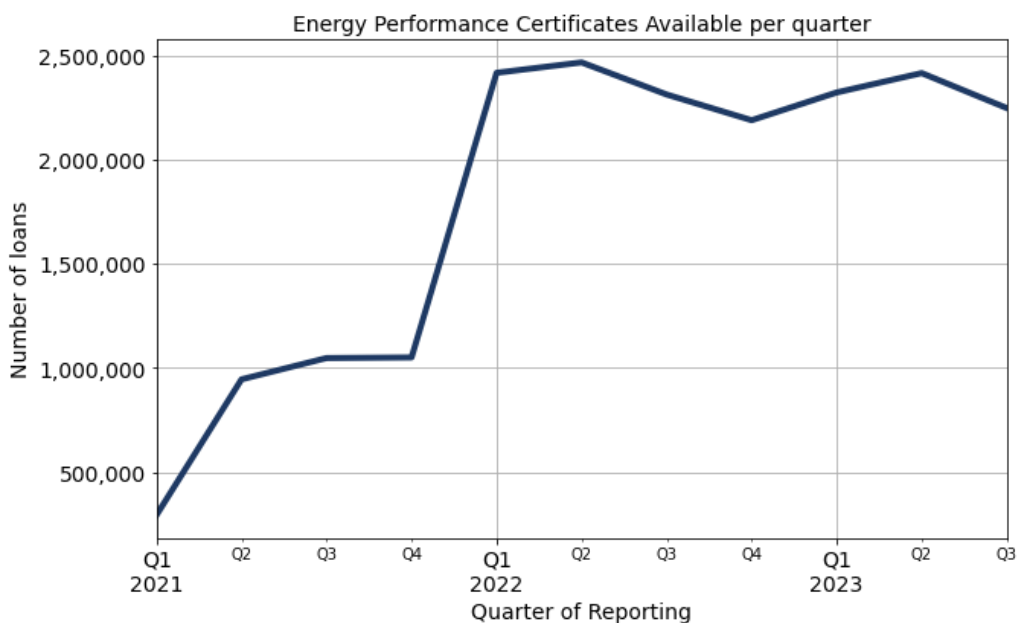
ENERGY PERFORMANCE CERTIFICATES ACROSS COUNTRIES

Germany has the highest amount of Energy Performance Certificates outstanding as of Q3 2023
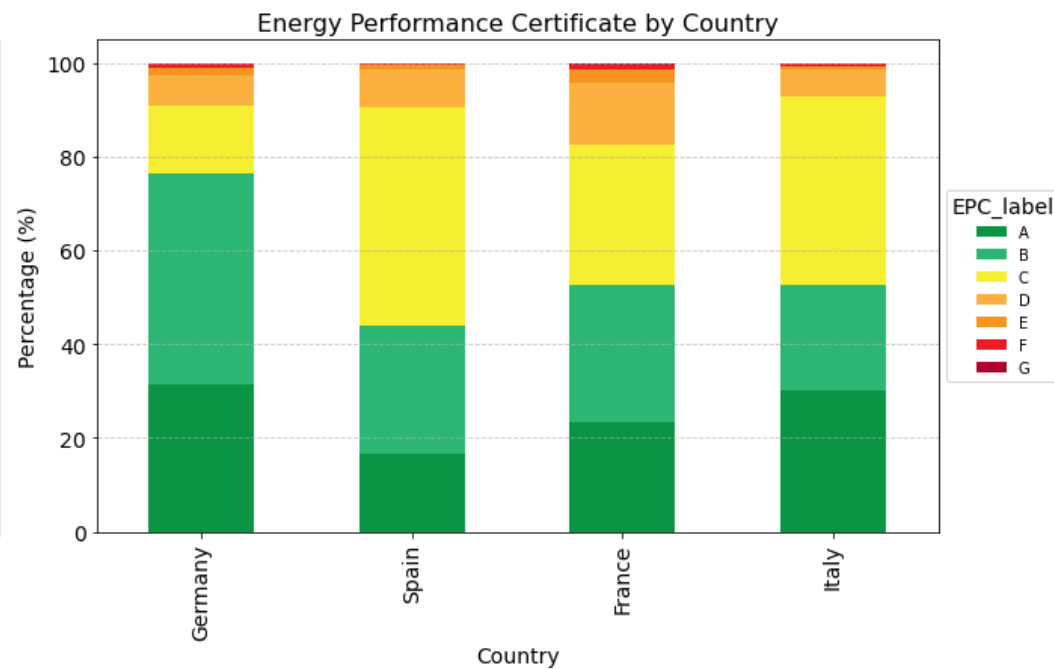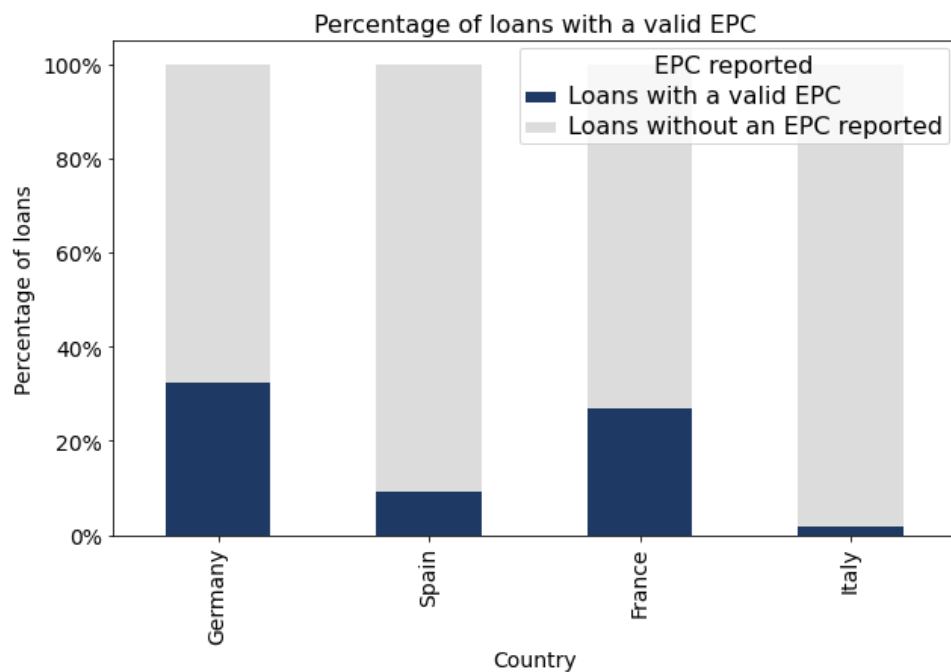
ENERGY PERFORMANCE CERTIFICATES

EPCs give a good understanding of a car's energy efficiency, but comparability is limited due to country differences

Energy Performance Certificate by Country
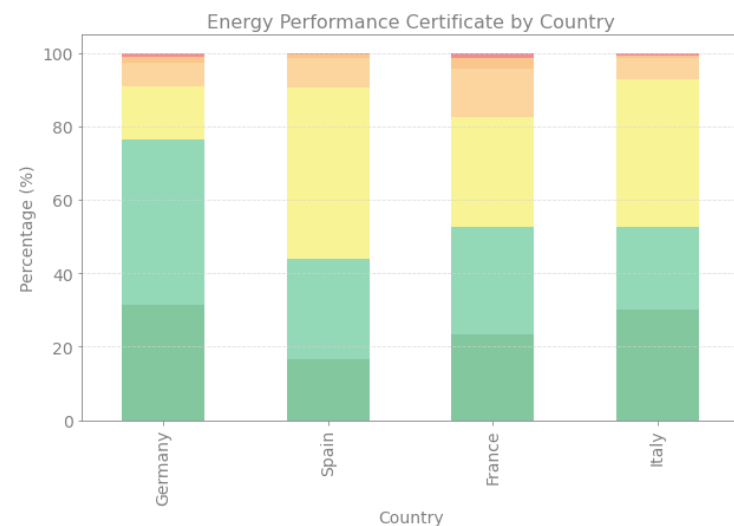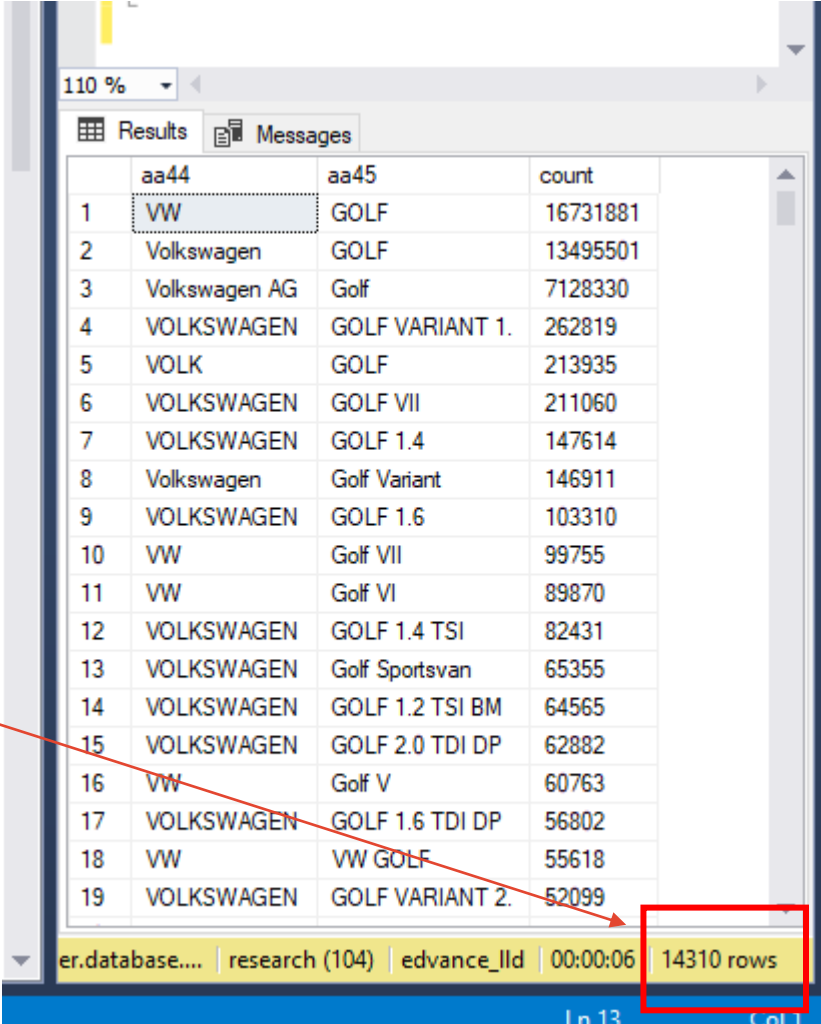
EPCs assigned to FIAT 500 and Land Rover SUVs – Germany vs France
(Based on number of loans using EDW data)
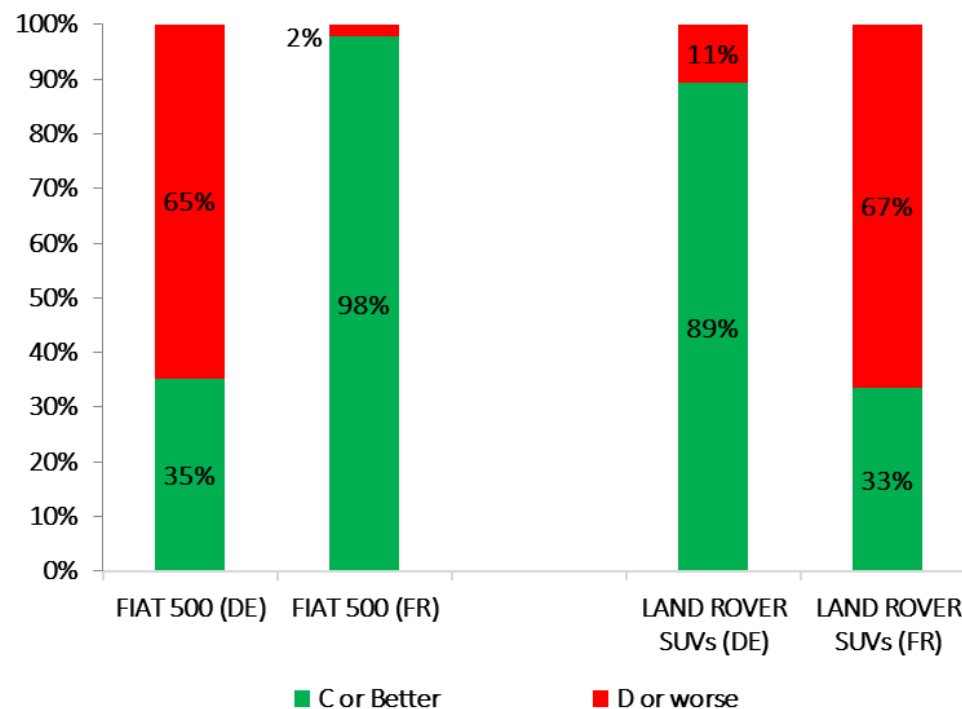
EDW DATA – MINING CAR MODEL DATA TO IMPLY FUEL TYPE
Car Manufacturer and Model is reported to EDW for each Auto loan/lease

- Need to standardise these 3 characteristics:
  - Manufacturer
  - Model
  - Imply Fuel Type (not Available in the templates)

- A large text mining excercise:
  - **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

er.database.... | research (104) | edvance_lld | 00:00:06 | 14310 rows

Ln 13 Col 1

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

30 to 60 Days Delinquencies by Fuel Type

Source: European DataWarehouse
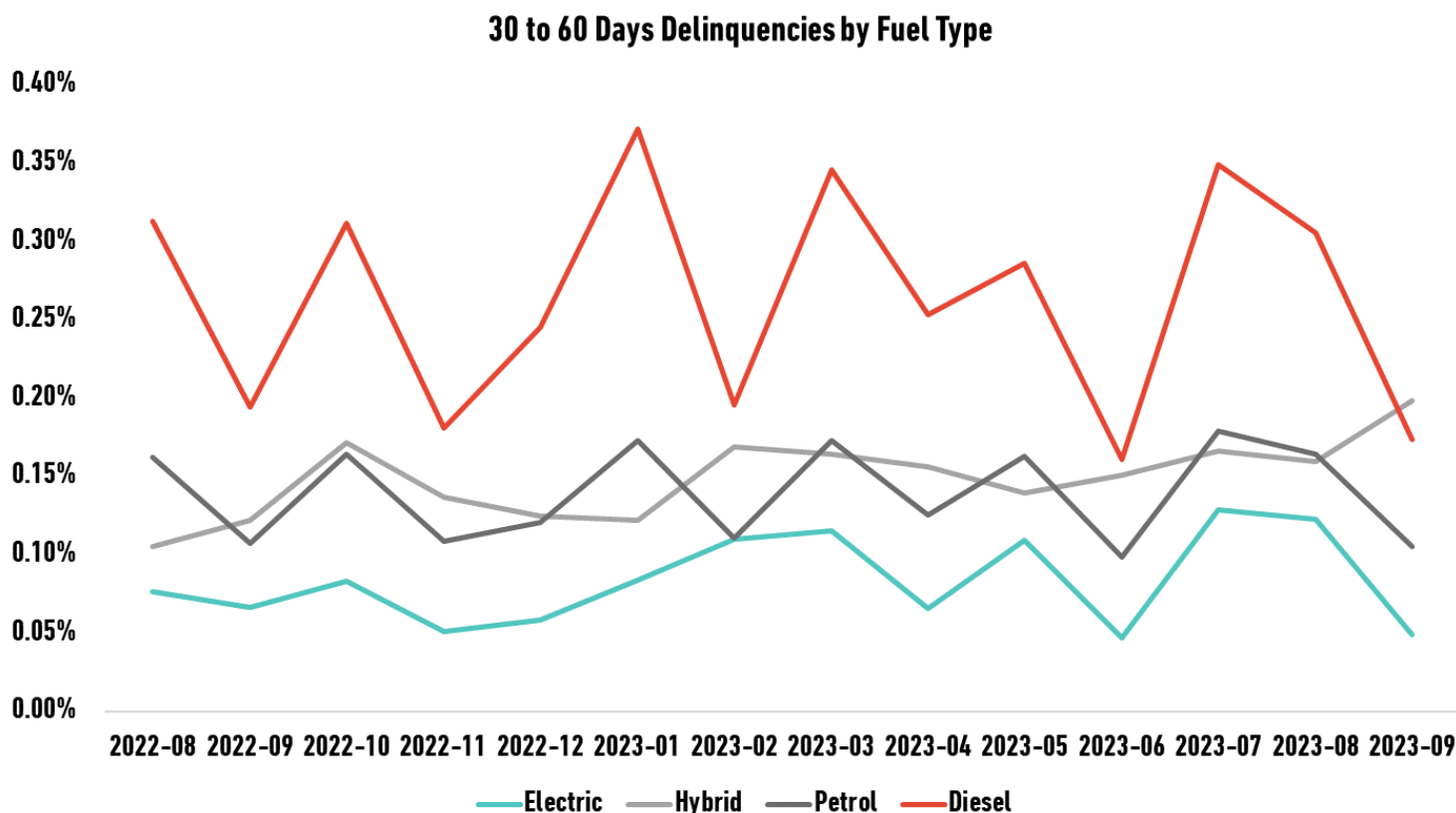
AUTO ABS – BORROWER INCOME BY FUEL TYPE

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

Average Net Income of Borrower by Fuel Type

Legend: Diesel, Petrol, Hybrid, Electric

Source: European DataWarehouse
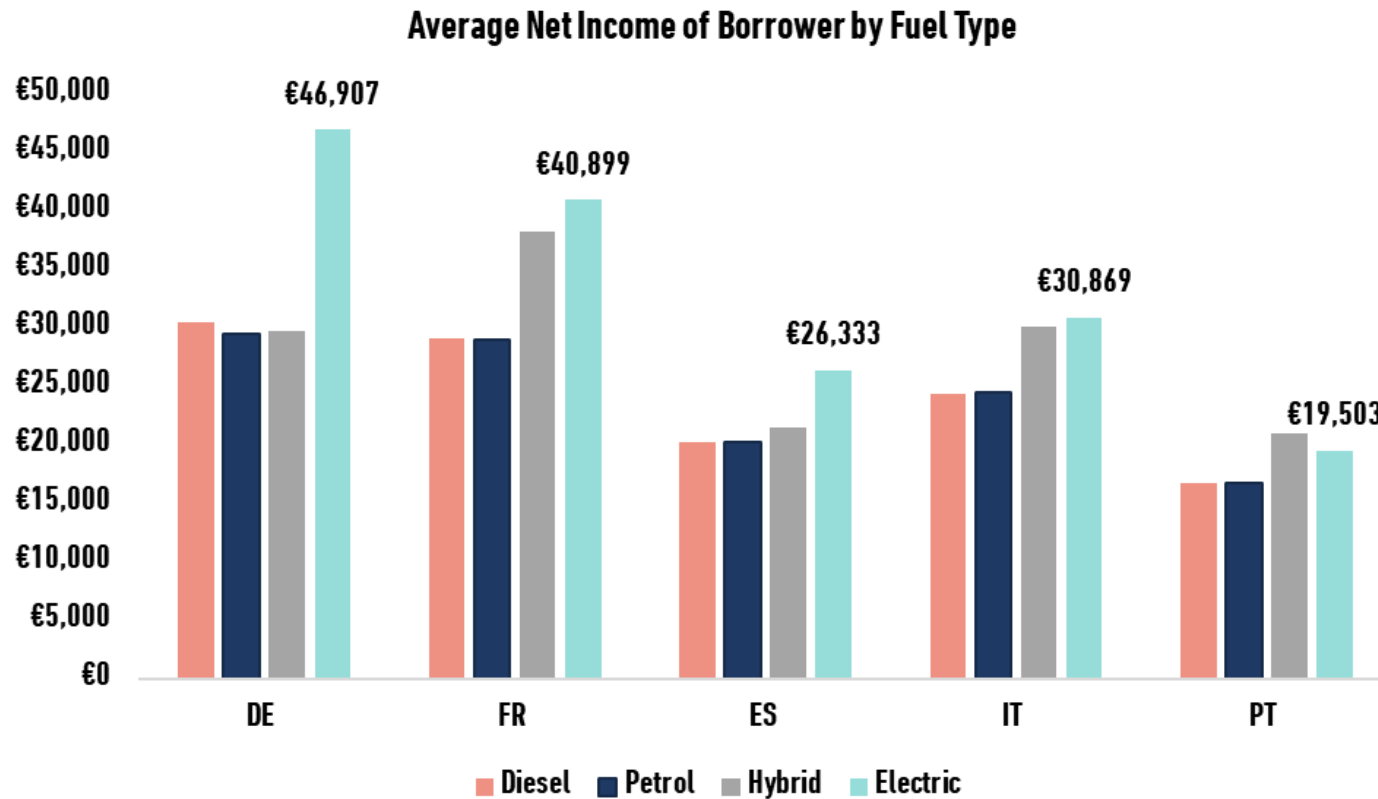
ESTIMATING CO$_2$ EMISSIONS FOR CAR LOANS/LEASES IN EDW DATA
Matching EDW data with European Environment Agency (EEA) data

EDW DATA

| Standardised Manufacturer |
| Standardised Model |
| Implied Fuel |
| Country of Asset |
| Year of Registration |

| CO$_2$ Emissions |
| Car Weight |

EEA DATA

| Standardised Manufacturer |
| Standardised Model |
| Fuel |
| Country |
| Year of Registration |

| CO$_2$ Emissions |
| Car Weight |
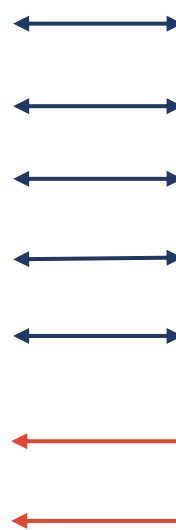
Assumptions

- If fuel cannot be implied using available info, the average CO$_2$ 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 CO_2 Emissions estimate

% of loans/leases matched with CO_2 estimates
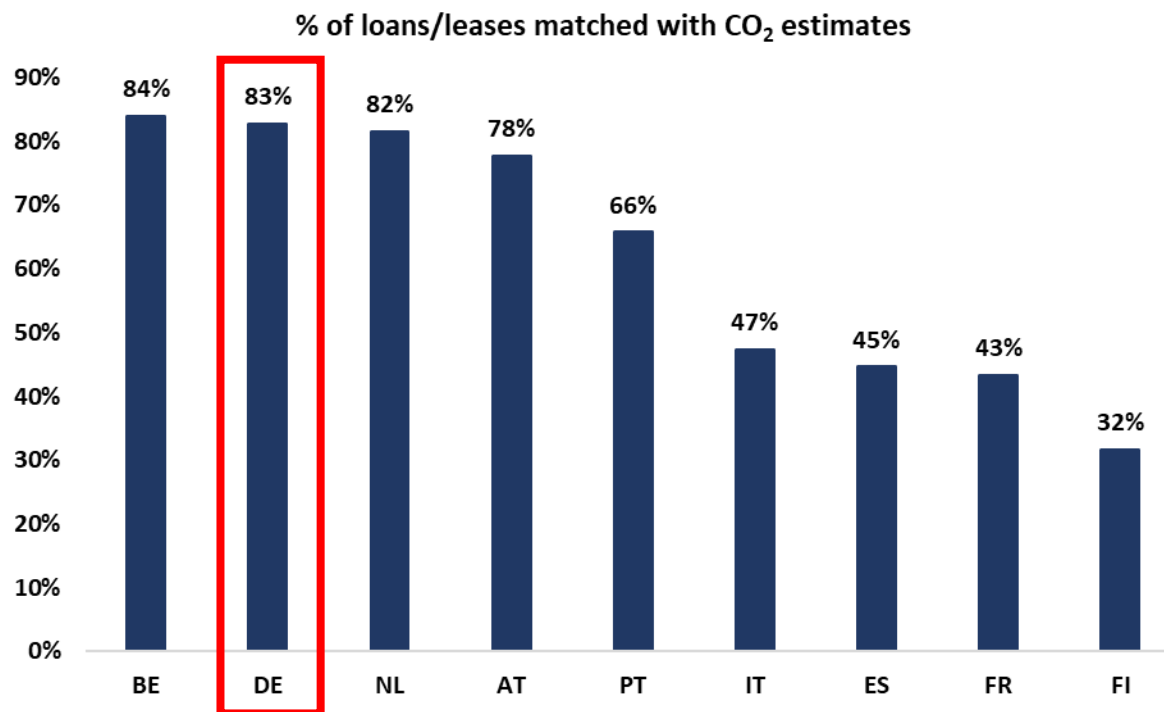
GERMAN AUTO ABS – 30 TO 60 DAY DELINQUENCIES (% OF BALANCE)

Low emission vehicles seem to have lower delinquency levels

30 to 60 Days Delinquencies by CO_2 Emissions

Legend: 0 | 0 to 100 | 100 to 150 | 150 to 200 | 200 or more

Source: European DataWarehouse
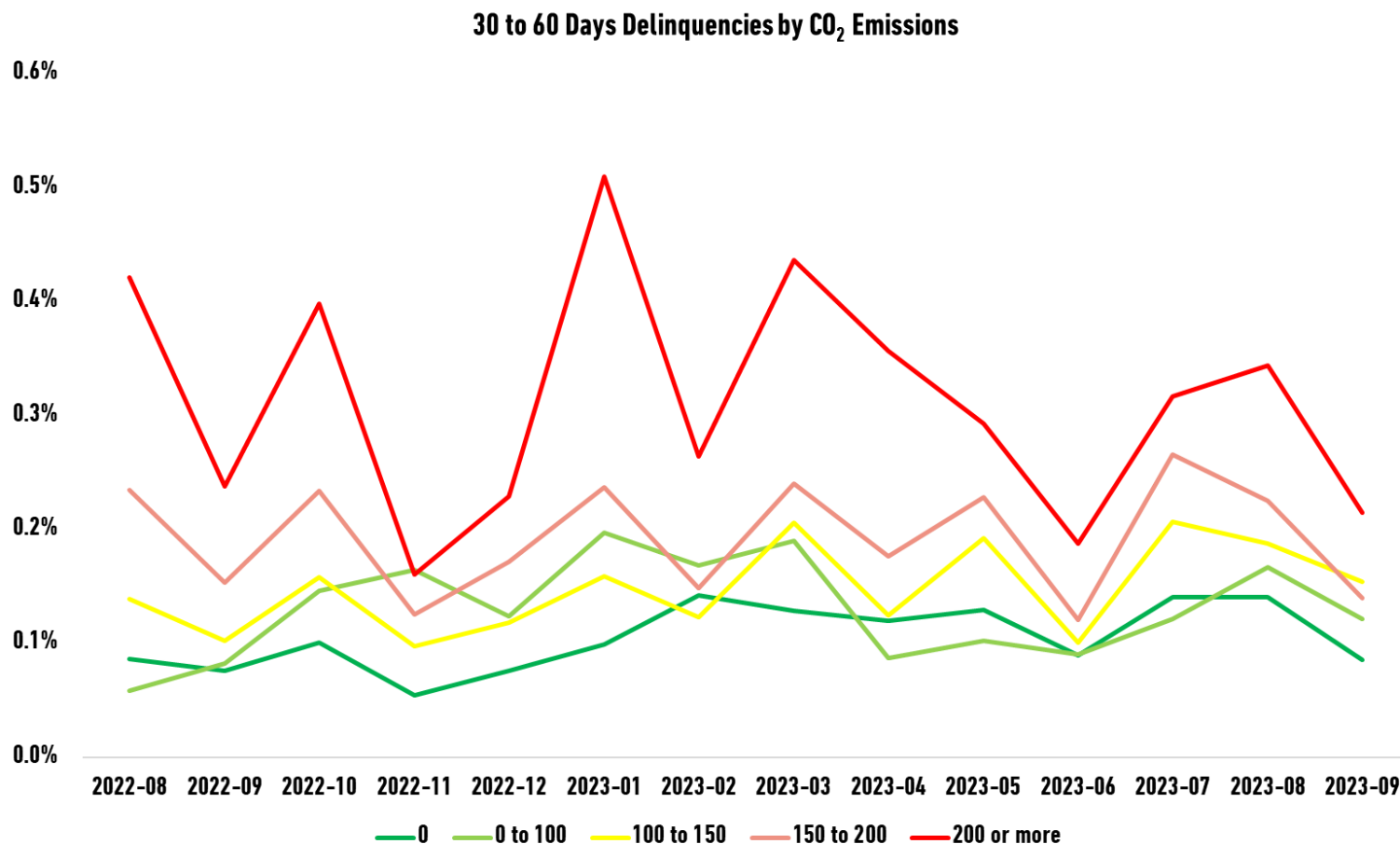
CO$_2$ EMISSIONS ESTIMATES

Germany has highest estimated average CO$_2$ emissions for cars in ABS portfolios

Avg CO$_2$ Emissions (g/km) for all ABS deals by Country (WLTP Standard weighted by Balance of loans)
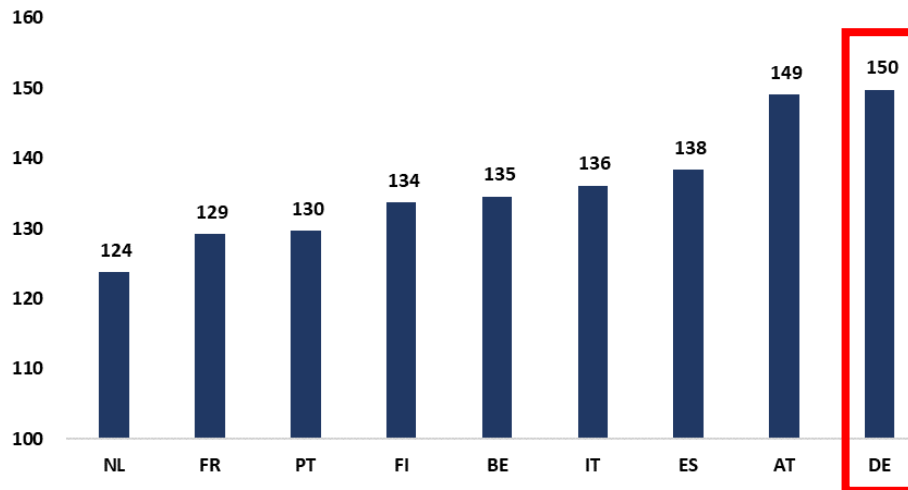
Source: European DataWarehouse

Avg car weight (kg) for New cars registered in 2022

■ Excluding Electric cars   ■ All cars
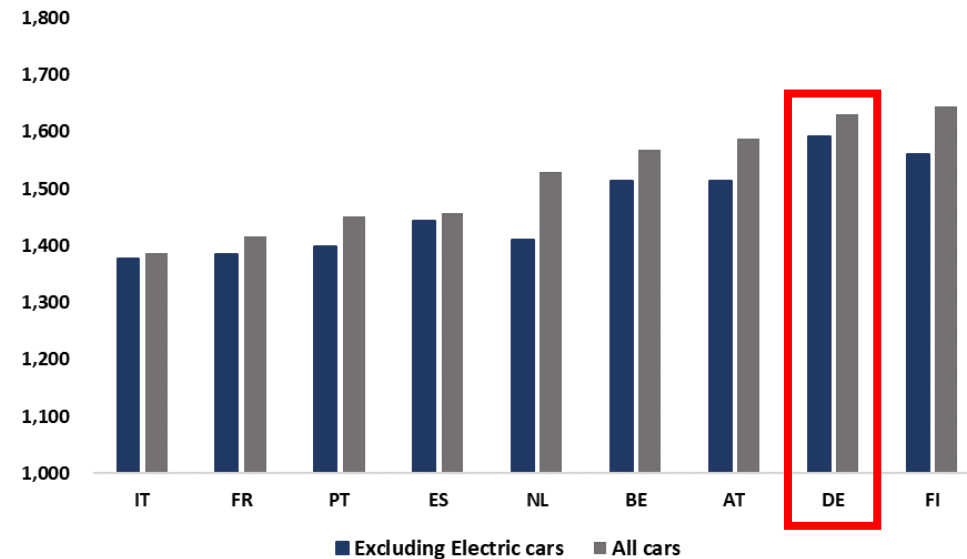
Source: European Environment Agency

- German consumers appear to have a preference for heavier cars

CO_2 EMISSION TRENDS

German consumers are buying more low emission vehicles every year

Avg CO_2 emissions (g/km) of New Passenger Cars in Germany has fallen each year

Year	Value
2019	156
2020	136
2021	114
2022	106
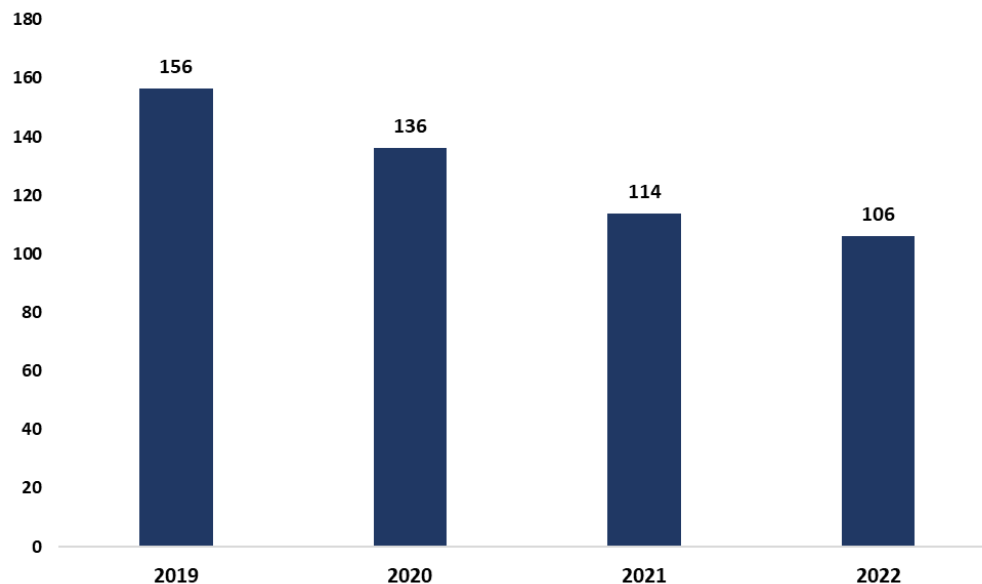
Source: European Environment Agency

Avg CO_2 emissions (g/km) of New Passenger Cars in 2022

Country	Value
FI	85
NL	86
FR	103
PT	103
BE	105
DE	106
AT	112
IT	119
ES	122
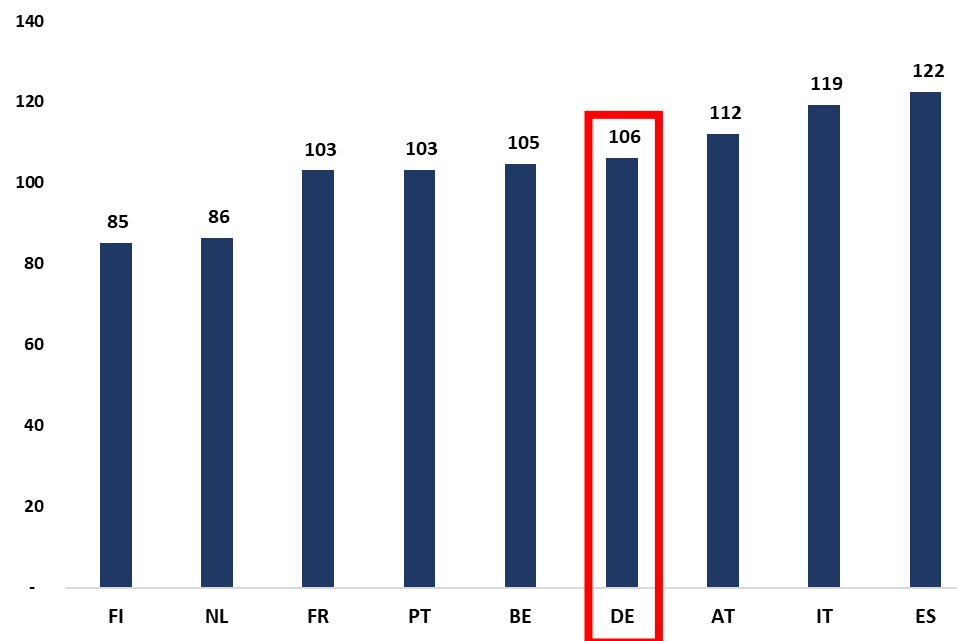
Source: European Environment Agency

CO$_2$ EMISSIONS OUTLOOK

Average emissions have not yet decreased as much as expected in German ABS portfolios

- ABS portfolios also contain commercial vehicles and trucks (with significantly higher CO$_2$ emissions)
- 'Weighted by Balance' approach (for ABS) gives a higher weight to expensive (often big engine models) vehicles whereas with number of cars approach each car is assigned the same weight
- The downward trend in average CO$_2$ emissions for Auto ABS is expected to continue as newer cars become securitised in future transactions!

Avg CO$_2$ Emissions for German ABS Transactions by Year of Issuance
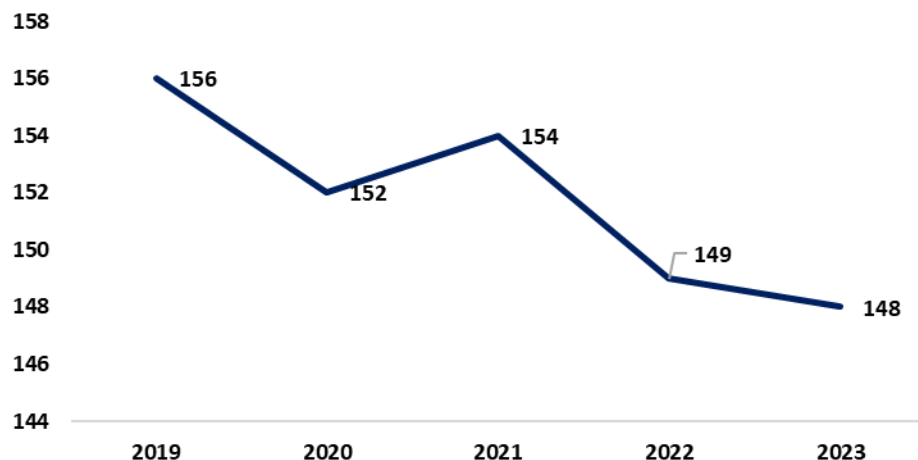
Cars in Auto ABS are often older
(Age of Cars in German ABS Transactions by Year of Issuance)

upto 2 years old   2 to 5 yrs   6 or more

Source: European DataWarehouse
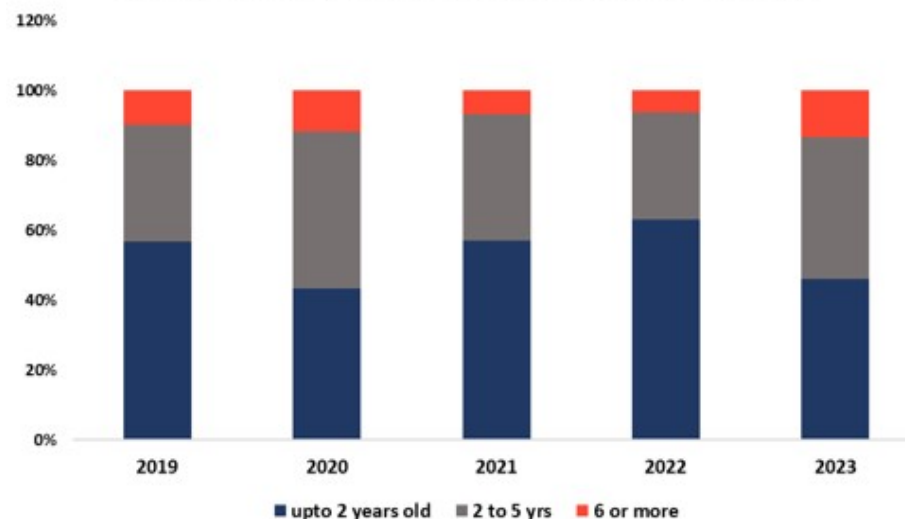
THANK YOU // CONTACT US

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📞 **enquiries@eurodw.eu**

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✉ **andrea.bedin@eurodw.eu**

usman.jamil@eurodw.eu

What are the incentives for ESG disclosures?

Dianora Aria De Marco (ISSB)

Paolo Conti (DBRS Morningstar)

Moderator: Christian Thun (European DataWarehouse)

14:50 – 15:30

Driving the Future

European Green Auto Securitisation Workshop

Paolo Conti, Head of European ABS

November 8, 2023

Nondefaulted Contract Volumes & Early-Stage Arrears Performance for Selected Models (DE)
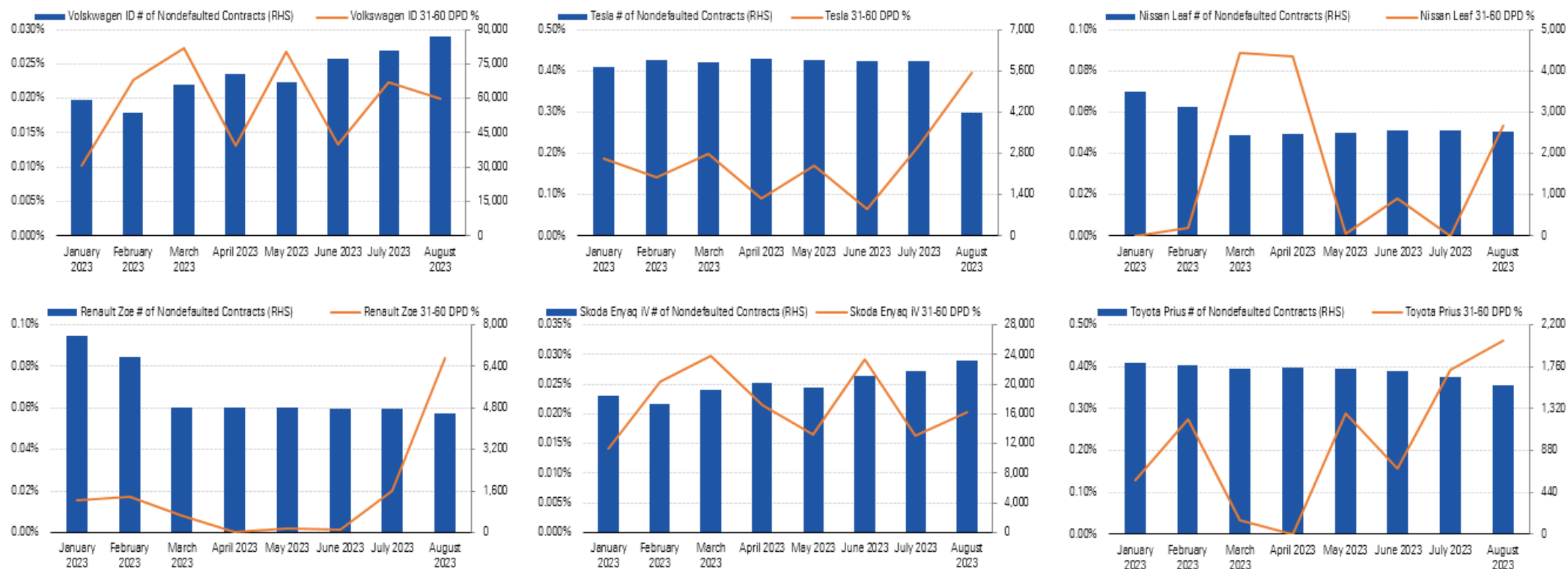
European DataWarehouse, DBRS Morningstar

Early-Stage Arrears by Vehicle Year of Registration (DE)
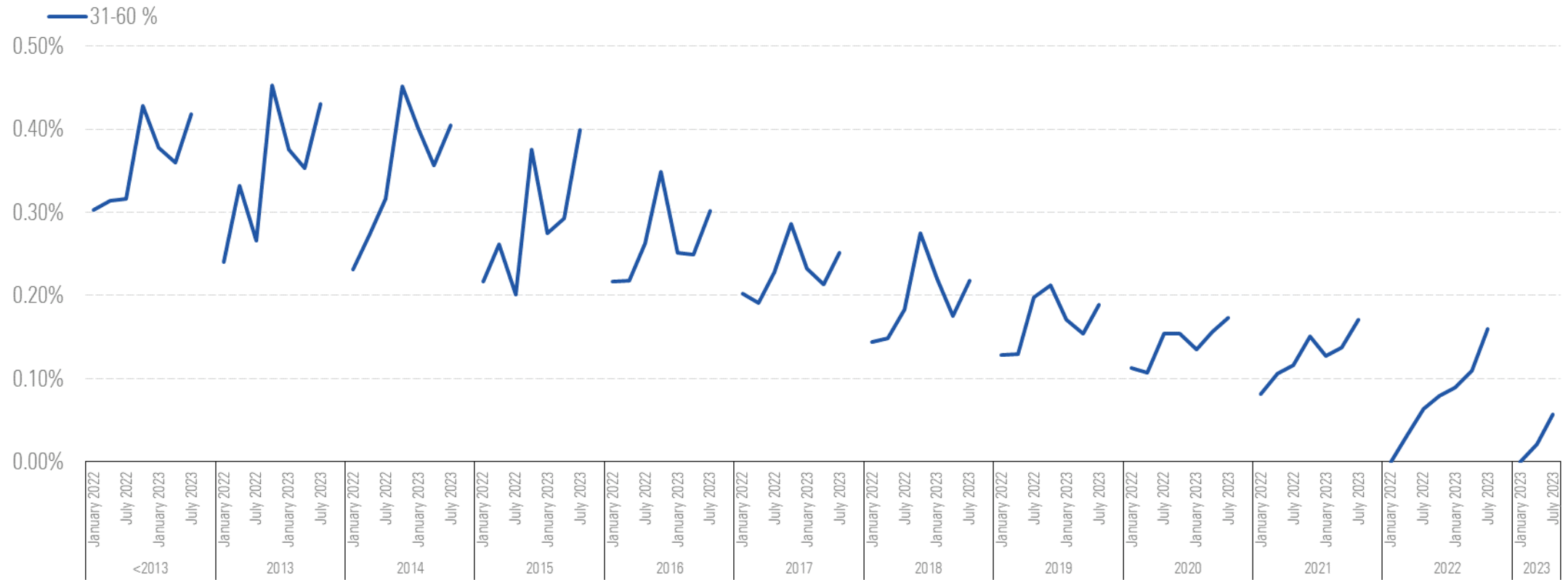
European DataWarehouse, DBRS Morningstar

MORNINGSTAR | DBRS

Residual Values vs. Used Cars Price Index in DE

Price index by fuel type (prices @100 as at 3 Jan 2021)
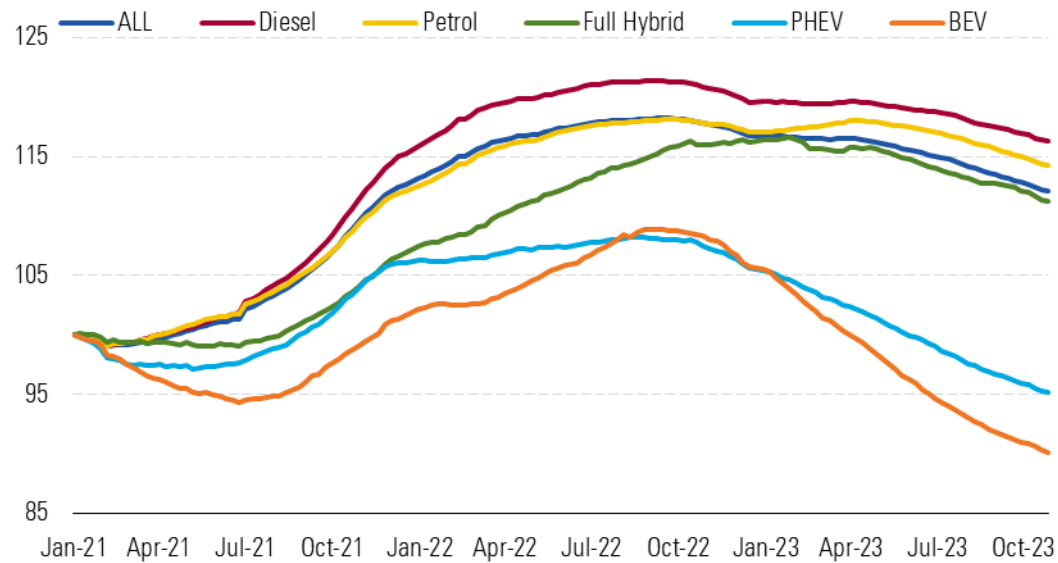
Retail RV% by fuel type (3 years / 60,000 km)
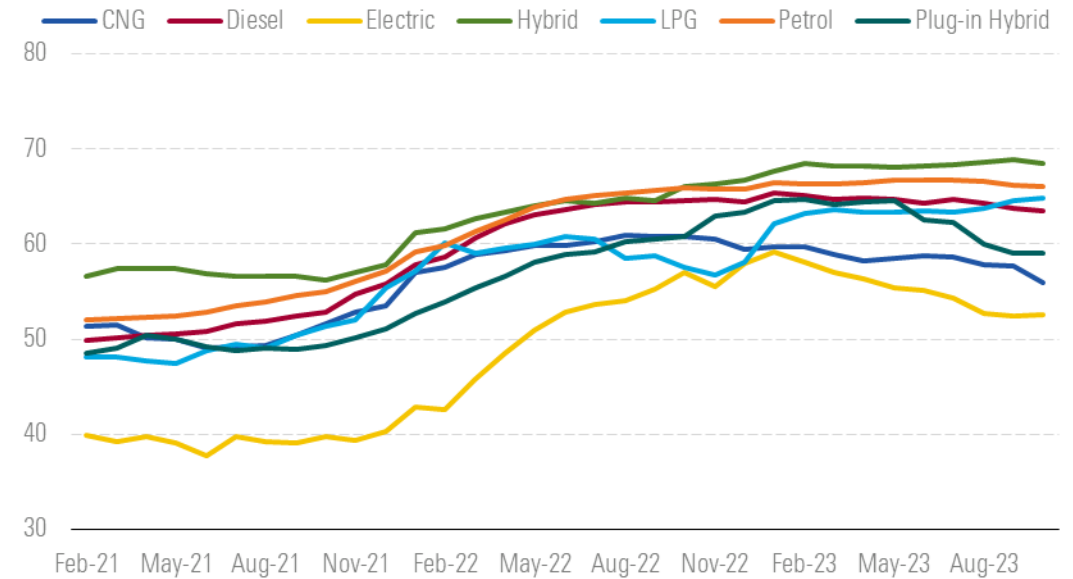
Autovista, Residual Value Intelligence

MORNINGSTAR | DBRS

Retail RV% by fuel type for the top 5 manufacturers and Tesla in DE

Autovista, Residual Value Intelligence

MORNINGSTAR | DBRS

Coffee break

15:30 – 16:00

Driving the Future:

Is It Time for a Sustainable Auto Securitisation Blueprint?

Marco Angheben (European DataWarehouse)

Jacob Binnema (MUFG Securities)

Liliana Bara de La Fuente (ECB)

Jan Peter Hülbert (TSI)

Moderator: Loriana Pelizzon (SAFE, Goethe University)

16:00 – 16:55

Closing remarks

Loriana Pelizzon (SAFE, Goethe University)

Get together

17:00 – 18:00