Better Be Careful: The Replenishment of ABS backed by SME Loans

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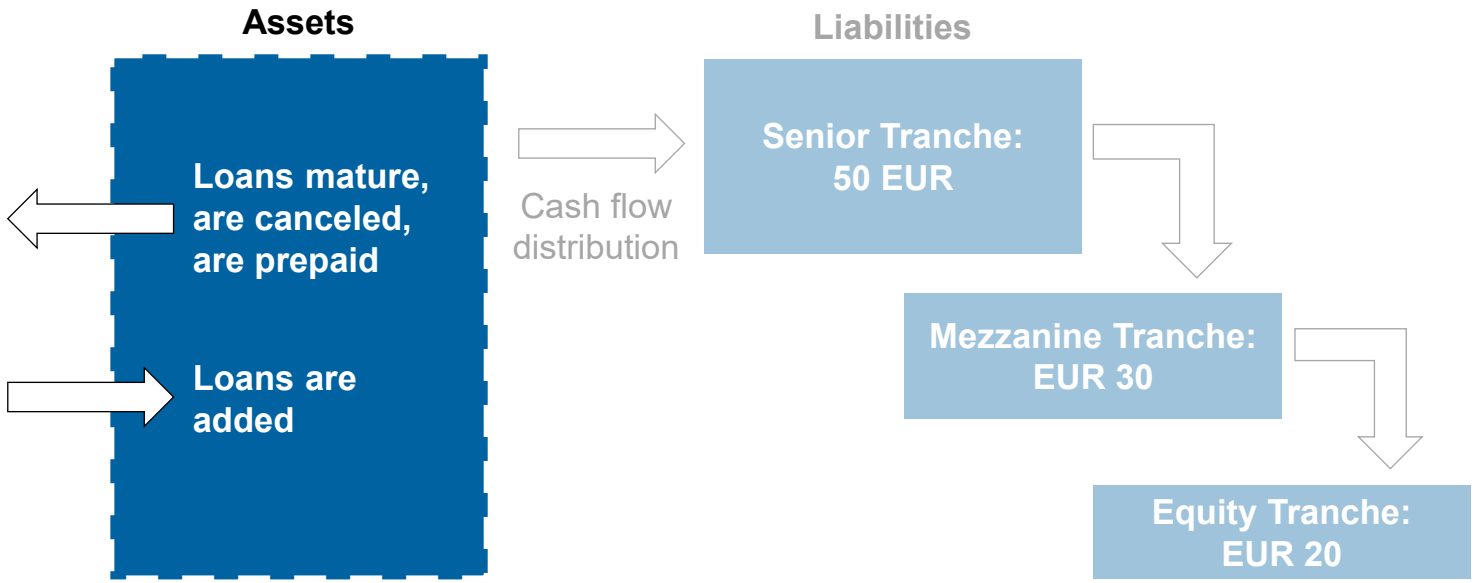
Dynamics in securitization

ABS portfolios are not necessarily static over time:

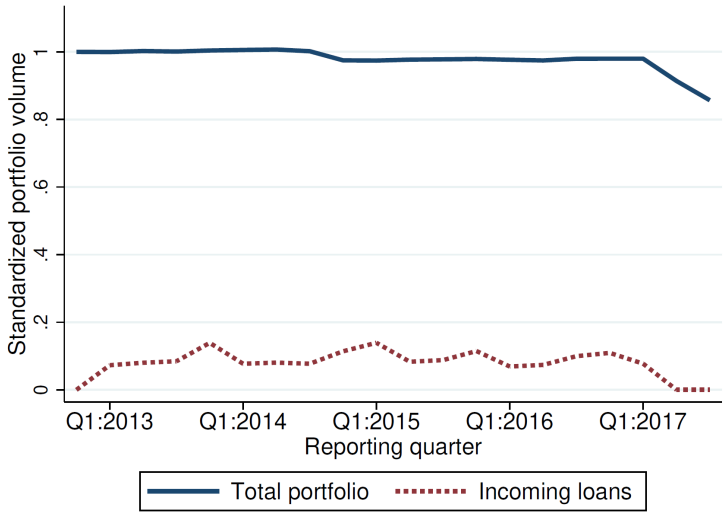
- *Reason:* Much longer time to maturity of ABS than that of the underlying loans
- *Our sample:* Ø ABS term: 30 years vs. Ø loan term: 8 years

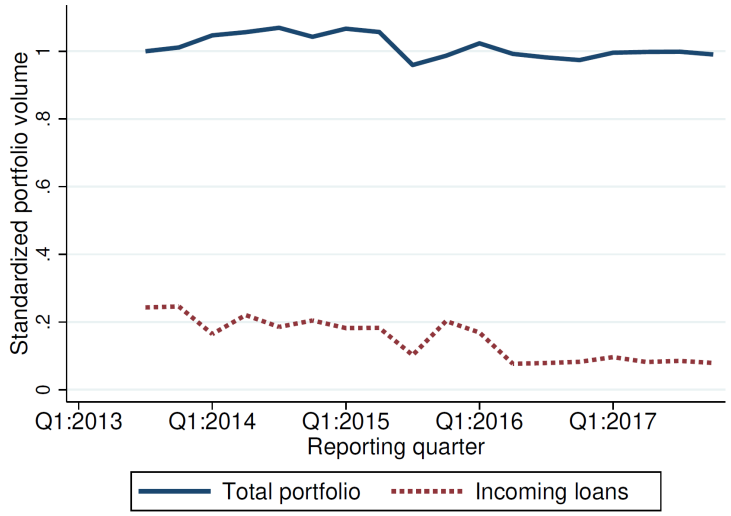


Portfolio replenishment refers to the **transfer of loans to the SPV after the transactions' closing** due to originators' need to reinvest released capital arising from the repayments of the borrowers.

Relevance of portfolio replenishment

Two exemplary ABS portfolios from our sample:





Incoming loans are loans whose first reporting quarter is chronologically after the closing of the corresponding ABS transaction (Ø 46% of observations in our sample).

Portfolio replenishment **may fundamentally change portfolio composition after transactions' closing** and is thus highly relevant for investors' risk-return profile.

Asymmetric information in securitization

Agency conflicts are prevalent in securitization:

- Many studies on the effects of asymmetric information (screening, monitoring, loan selection)
  - E.g., Keys et al., 2010, 2012; An et al., 2011; Purnanandam et al., 2011
- Particularly wide scope of action for originators after transactions' closing because…
  - …investors already made their investment decision
  - …credit rating agencies assigned their security ratings

Ambiguous evidence on agency conflicts in collateralized loan obligations (CLOs):

- Large, mostly rated, and syndicated corporate loans with a low level of asymmetric information
  - E.g., Benmelech et al., 2012; Bord and Santos, 2015
- Active loan trading by asset managers with earnings-based incentives
  - E.g., Loumioti and Vasvari, 2019; Griffin and Nickerson, 2022

Originators may exploit their leeway and **add low-quality loans after the transactions' closing**, potentially adversely affecting investors' risk-return profile.

Contractual limitations and contribution

Portfolio replenishment is contractually limited:

- Loan eligibility criteria in ABS prospectuses with respect to observable characteristics
- Remaining leeway in the loan selection process due to originators' private soft information
- Significant differences to transaction structure and underlying loan portfolio in our sample and CLOs
  - No active loan trading by the bank or asset managers
  - Small, mostly fixed-rate, and non-syndicated loans to unrated small firms

We contribute to various strands of the literature:

- Loan selection for securitization (e.g., Downing et al., 2009)
- Agency conflicts in securitization backed by corporate loans (e.g., Benmelech et al., 2012)
- Non-static ABS portfolio composition (e.g., Elkamhi and Nozawa, 2022)
- Reputation and transparency in the securitization market (e.g., Ertan et al., 2017)

Portfolio replenishment is a surprisingly **not** yet **investigated** channel by which originators might exploit their information advantage over investors.

Research questions

We address four key research questions:

1. **Observed loan performance:**
   Do *Incoming loans* perform worse than loans that are already part of the initial ABS portfolio?

2. **Reason for observed loan performance differences:**
   Do originators induce the observed performance differences by selecting loans of lower quality for portfolio replenishment than for initial securitization?

3. **Effective mitigating measures:**
   Are reputational needs and / or stronger external monitoring through increased transparency in the ABS market effective in limiting originators‘ selection of low-quality loans?

4. **Investor awareness:**
   Do market prices capture originators’ portfolio replenishment behavior?

Data

We use a unique data set from the European DataWarehouse (EDW): EUROPEAN DATAWAREHOUSE

- ***Data sources:*** Central repository for ABS loan-level information in Europe, enriched with tranche pricing information from S&P Global (formerly IHS Markit)

- ***Asset class:*** SME securitizations
  - SMEs are especially affected by asymmetric information; e.g., Berger and Udell, 1995
  - Banks pursue a relationship banking approach with SMEs

- ***Observation period:*** 2012-2017

- ***Quarterly data on loan-level characteristics:***
  - 9.5 million observations
  - 1.8 million loans
  - 102 ABS portfolios

Granular loan-level data provides first opportunity to analyze portfolio replenishment in ABS.

Estimation strategy

We apply a two-step approach:

1. Do *Incoming Loans* perform worse than loans that are part of the initial ABS portfolio?

$$Loan\ Performance_{itp} = \alpha + \beta \cdot Incoming\ Loan_{it} + \gamma' \cdot Loan\ Controls + Several\ FE + \varepsilon_{itp}.$$

2. Do originators select loans of lower quality for portfolio replenishment?

$$Incoming\ Loan_{it} = \alpha + \beta \cdot Loan\ Quality_{itq} + \gamma' \cdot Loan\ Controls + Several\ FE + \varepsilon_{itq}.$$

Estimation procedure:

- *Loan performance:* Default, Default amount, Delinquency, Delinquent amount, Number of days in del.
- *Loan quality:* PD, LGD, PD x LGD
- *Loan controls:* Interest rate, collateralization, years since loan origination, loan years to maturity, current balance, securitized loan ratio, pool time, lending relationship, loan uniqueness
- *Several fixed effects:* Reporting quarter x ABS portfolio, loan origination year, industry, borrower type, and loan type

Baseline results on loan performance

***Incoming Loans* perform worse than loans that are part of the initial ABS portfolio:**

	Default	Default Amount	Delinquency	Delinquent Amount	Number of Days in Del.
Incoming Loan	0.00419***	0.0388***	0.0104***	0.0737***	0.0189**
	(0.0013)	(0.0130)	(0.0027)	(0.0219)	(0.0096)
Loan Controls	Yes	Yes	Yes	Yes	Yes
Rep. quarter x ABS portfolio FE	Yes	Yes	Yes	Yes	Yes
Loan origination year FE	Yes	Yes	Yes	Yes	Yes
Industry & borrower type & loan type FE	Yes	Yes	Yes	Yes	Yes
N	9,528,549	9,528,549	9,528,549	9,528,549	9,528,549
Adj. R^2	0.28	0.06	0.17	0.17	0.12

Robust SE clustered w. r. t. the reporting quarter x ABS portfolio are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Incoming Loans exhibit a **0.42 pp higher probability of default** and a **1.04 pp higher probability of delinquency**.

Additional results on loan performance

Portfolio replenishment lowers the average portfolio performance:

	Differences between *Incoming Loans* and *Outgoing Loans*				
	Default	**Default Amount**	**Delinquency**	**Delinquent Amount**	**Number of Days in Delinquency**
Nearest neighbor ($n = 1$)	0.0059***	0.0649***	0.0078**	0.0547	0.0309**
	(0.0014)	(0.0182)	(0.0047)	(0.0364)	(0.0146)
Nearest neighbor ($n = 5$)	0.0059***	0.0638***	0.0099***	0.0531*	0.0380***
	(0.0014)	(0.0141)	(0.0036)	(0.0281)	(0.0115)
Nearest neighbor ($n = 10$)	0.0059***	0.0643***	0.0089***	0.0457**	0.0334***
	(0.0014)	(0.0131)	(0.0034)	(0.0261)	(0.0107)
Nearest neighbor ($n = 20$)	0.0059***	0.0640***	0.0093***	0.0478**	0.0342***
	(0.0015)	(0.0125)	(0.0033)	(0.0253)	(0.0105)
Nearest neighbor ($n = 50$)	0.0059***	0.0653***	0.0081***	0.0379**	0.0334***
	(0.0015)	(0.0122)	(0.0033)	(0.0251)	(0.0104)
N					1,059,323
Number of *Incoming Loans*					552,884
Number of *Outgoings Loans*					506,439

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust SE are in parentheses.

Baseline results on loan quality

Originators seem to induce the performance differences by selecting low-quality loans:

	Incoming Loan	Incoming Loan	Incoming Loan	Incoming Loan
PD	0.844***			
	(0.1307)			
LGD		0.0202**		
		(0.0092)		
PD x LGD			1.413***	
			(0.3022)	
PD x Default				0.409***
				(0.0668)
Controls	Yes	Yes	Yes	Yes
Rep. quarter x ABS portfolio FE	Yes	Yes	Yes	Yes
Loan origination year FE	Yes	Yes	Yes	Yes
Industry & borrower type & loan type FE	Yes	Yes	Yes	Yes
N	9,528,526	8,771,945	8,771,925	9,528,526
Adj. R^2	0.69	0.68	0.68	0.69

Robust SE clustered w. r. t. the reporting quarter x ABS portfolio are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Baseline results on mitigating measures

Reputation needs and transparency represent effective remedies for agency conflicts:

	Incoming Loan	Incoming Loan	Incoming Loan
PD	1.053***	0.949***	0.881***
	(0.1813)	(0.1387)	(0.1357)
PD x Frequent Issuer	-0.452*		
	(0.2536)		
PD x Transparent Loan		-2.539***	
		(0.2613)	
PD x Frequent Issuer x Transparent Loan			-3.187***
			(0.4290)
Transparent Loan		0.286***	0.284***
		(0.0252)	(0.0257)
Controls	Yes	Yes	Yes
FE	Yes	Yes	Yes
N	9,528,526	9,528,526	9,528,526
Adj. R^2	0.69	0.71	0.71

Robust SE clustered w. r. t. the reporting quarter x ABS portfolio are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Baseline results on investor awareness

Investors appear to reward presumed portfolio replenishment first, but learn over the ABS term and pay lower tranche prices for more strongly replenished loan portfolios:

	Yield Spread		Traded Price	Traded Price	Traded Price
Maturity Mismatch	-0.725***	Replenished Loan Share	36.36***	-43.54***	-15.91**
	(0.2232)		(5.8808)	(13.6289)	(4.2098)
Controls	Yes	Controls	Yes	Yes	Yes
Emission Year FE	Yes	Reporting Quarter x	Yes	Yes	Yes
Country FE	Yes	Country FE			
Rating FE	Yes	Rating FE	Yes	Yes	Yes
Reference Rate FE	Yes	Reference Rate FE	Yes	Yes	Yes
N	72	*N*	5,579	12,511	18,108
Adj. R^2	0.77	Adj. R^2	0.79	0.90	0.85

Robust SE clustered w. r. t. the ABS portfolio are in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Less than 1 year after the first reporting to EDW

More than 1 year after the first reporting to EDW

All observations

Additional analyses and robustness checks

Refining our main results:

- ✓ Restrict sample to ABS transactions for which the closing is within our sample period
- ✓ Vary loan term measures
- ✓ Conduct propensity score matching (incoming vs. outgoing loans)

Varying PD estimation:

- ✓ Replace own PD estimates with banks' internally estimated PDs
- ✓ Apply a sequential PD estimation procedure

Further robustness checks:

- ✓ Add FE step by step
- ✓ Control for country-specific characteristics
- ✓ Add additional originator characteristics
- ✓ Draw more balanced random samples (defaulted vs. non-defaulted loans)
- ✓ Probit regression in case of propensity score matching

Take-Home Insights

Our findings indicate the following:

1. Incoming loans perform worse than loans that are part of the initial ABS portfolio.
2. Originators seem to induce these performance differences by adding loans of lower quality to securitized loan portfolios.
3. Reputational needs and increased transparency are effective in mitigating this adverse originator behavior.
4. Investors appear to learn over the ABS term and pay a lower price for those tranches whose underlying loan portfolio is replenished more strongly.

Contribution and policy implications:

- Exploring portfolio replenishment for the first time in detail in academic literature
- Findings may provide guidance for policymakers on how securitization markets could be made more sustainable and trustworthy in the future

Thank you
for your attention!

Link to the paper

Further versions of the paper

Bundesbank Discussion Paper No 30/2021

https://www.bundesbank.de/resource/blob/875196/6b9223bf777a7e37b67c828bb850e6a8/mL/2021-09-10-dkp-30-data.pdf

Bundesbank Research Brief 52nd edition

https://www.bundesbank.de/resource/blob/896180/3fea708761be431e24865f7c2d7ba38a/mL/2022-52-research-brief-data.pdf

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Summary statistics

Variable	N	Mean	SD	p10	p50	p90
Replenishment measure						
Incoming Loan	9,528,558	0.46	0.50	0.00	0.00	1.00
Ex ante loan quality and and ex post loan performance measures						
PD	9,528,535	0.03	0.08	0.00	0.01	0.05
LGD	8,771,945	0.25	0.20	0.04	0.19	0.54
Default	9,528,558	0.03	0.16	0.00	0.00	0.00
Default Amount	9,528,558	0.20	1.43	0.00	0.00	0.00
Delinquency	9,528,558	0.10	0.31	0.00	0.00	1.00
Delinquent Amount	9,528,558	0.79	2.36	0.00	0.00	5.25
Number of Days in Del.	9,528,558	0.31	1.03	0.00	0.00	0.69
Controls						
Interest Rate (%)	9,528,558	3.53	1.70	1.48	3.33	5.75
Collateralization	9,528,558	0.73	0.44	0.00	1.00	1.00
Years since Loan Origination	9,528,558	1.35	0.63	0.49	1.34	2.22
Loan Years to Maturity	9,528,558	1.28	0.76	0.23	1.25	2.38
Current Balance	9,528,558	9.98	1.87	8.01	9.97	12.18
Securitized Loan Ratio	9,528,558	0.72	0.27	0.32	0.81	1.00
Pool Time	9,528,558	9.98	5.79	3.00	9.00	19.00
Lending Relationship	9,528,558	0.62	0.49	0.00	1.00	1.00
Loan Uniqueness	9,528,558	6.12	1.44	4.09	6.28	7.82
Mitigating factors						
Frequent Issuer	9,528,558	0.64	0.48	0.00	1.00	1.00
High-Volume Issuer	9,304,771	0.38	0.49	0.00	1.00	1.00
Transparent Loan	9,528,558	0.33	0.47	0.00	0.00	1.00