KATHOLISCHE UNIVERSITÄT EICHSTÄTT-INGOLSTADT

INGOLSTADT SCHOOL OF MANAGEMENT

COVID-19 and the Fragility of Credit Supply by Shadow Banks

… or the Problem of Mixing  and 

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01/27/2021, Brown Bag Seminar @ WFI

Outline of the Talk

1. **Introduction: Institutional Background**
2. Theory: Lending vs. Trading
3. Motivation
4. Main Results: Predictability of Loan Returns
5. Mechanism: Lending vs. Trading
6. Corporate Finance Implications
7. Conclusion

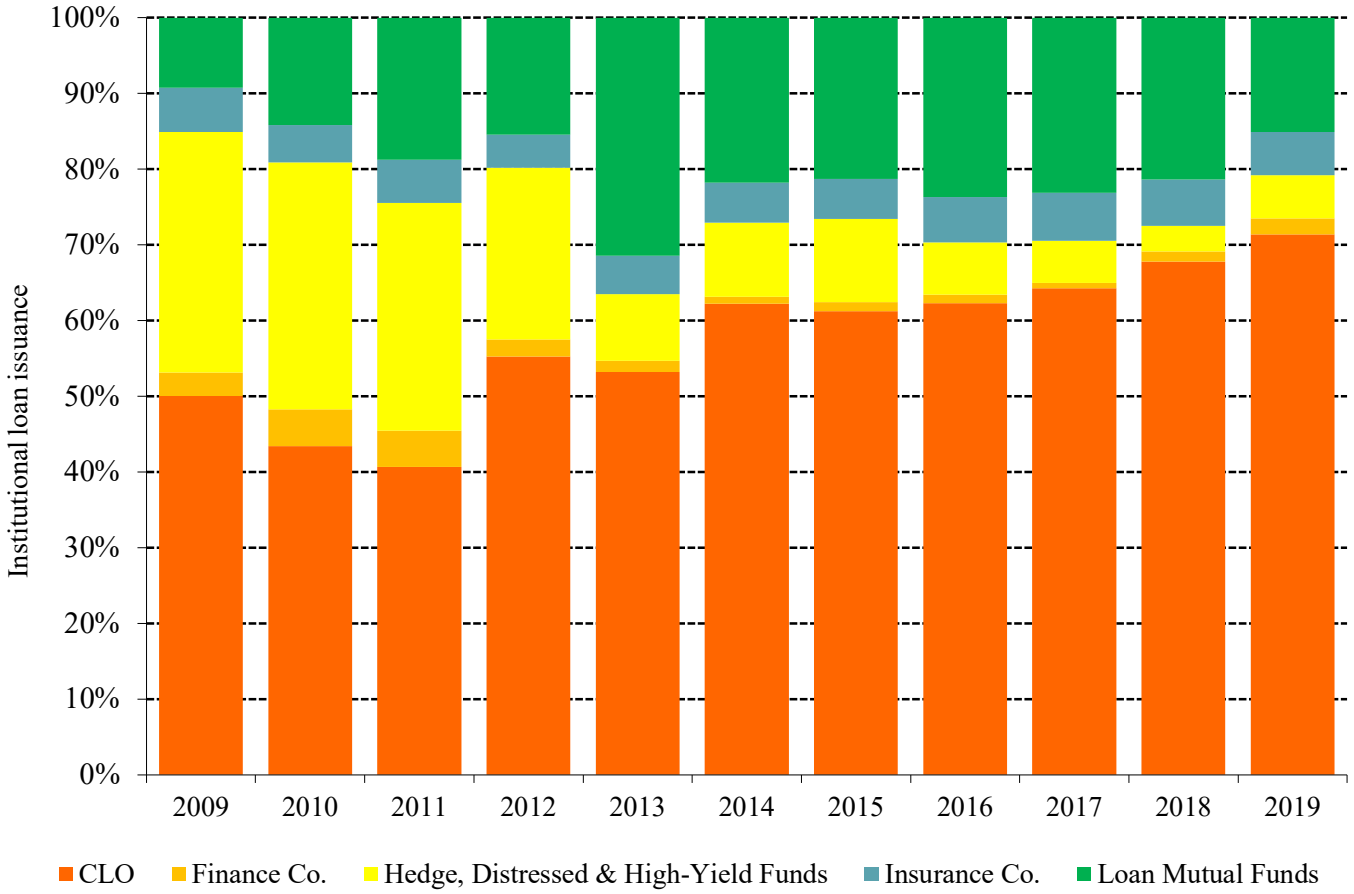
Institutional Background

The market for leveraged loans comprises different market segments, facilities and institutions

Leveraged loans are sizeable Current outstanding volume > 2.2 Trillion USD		
Market Segments	Facilities	Institutions
Primary market: Loan issuance, lending **Secondary market:** Trading	**Pro rata facilities:** Unfunded revolving credit & amortizing (revolvers, term loans A) **Institutional facilities:** First- and second-lien, non-amortizing, fully funded (term loans B, C, D, ...)	**Traditional bank intermediaries** **Institutional investors/shadow banks:** CLOs, mutual funds/ETFs, …

Institutional Background

The largest non-bank investors in leveraged loans are loan mutual funds and CLOs



Institutional Background

CLOs and mutual loan funds face diverging exposure to asset/liability shocks – an apples and oranges issue

Loan Mutual Funds	CLOs
• Closed-end: Continuously offered funds with redemptions on a monthly or quarterly basis or ETFs • Opend-end: „Daily-access“ funds	• Financed through the issuance of debt & equity that have rights to the collateral and payment stream

Invest in

Lev. Loans: Infrequently traded, long settlement periods

Financial stability concerns/**„Run-on-the-fund“** phenomenon: Selling pressure into illiquid markets during downturns can lead to collapse	Do not mark-to-market, liabilities are not redeemable on short notice: May **„lean against the wind“** if secondary market prices fall[1]

[1] Chorodow-Reich et al. (2020) call these institutions asset insulators

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Lending vs. Trading Theory [1]

… rationalizes divergent lending dynamics of financial institutions with stable and unstable liabilities

I. Assumptions:
   I. Banks engage in two activities: Lending and securities trading
   II. Banks are of two types: Some have stable (long-term) liabilities, others have unstable (revolving, short-term) liabilities

II. Implication: Exogenous asset price shocks exert a **negative externality** on credit supply, because…
   I. … banks with unstable liabilities face outflows/redemptions → **Fire sales** lead to temporary price dislocations
   II. … banks with more stable liabilities act contrarian: "**Buying when others are selling**"

[1] according to Diamond and Rajan (2011) and Shleifer and Vishny (2010)

Lending vs. Trading Theory [1]

… transferring the theory to the leveraged loan setting implies:

I. Because banks do not trade loans, their lending behavior should be insensitive to secondary loan market prices!

II. Because institutional investors do trade loans, their lending behavior should be sensitive to secondary loan market prices!

III. Institutional investors are of two types: Some have stable liabilities  , some have unstable liabilities 

IV. Important predictions:

   I. The relative amount of institutional issuance (*Institutional Share*[2]) should negatively predict secondary loan market price changes (expected returns)!

   II. The predictive ability of *Institutional Share* should be strongest in times when loan mutual funds  face outflows!

[1] according to Diamond and Rajan (2011) and Shleifer and Vishny (2010)

[2] Institutional Share = Inst. loan issuance / total loan issuance

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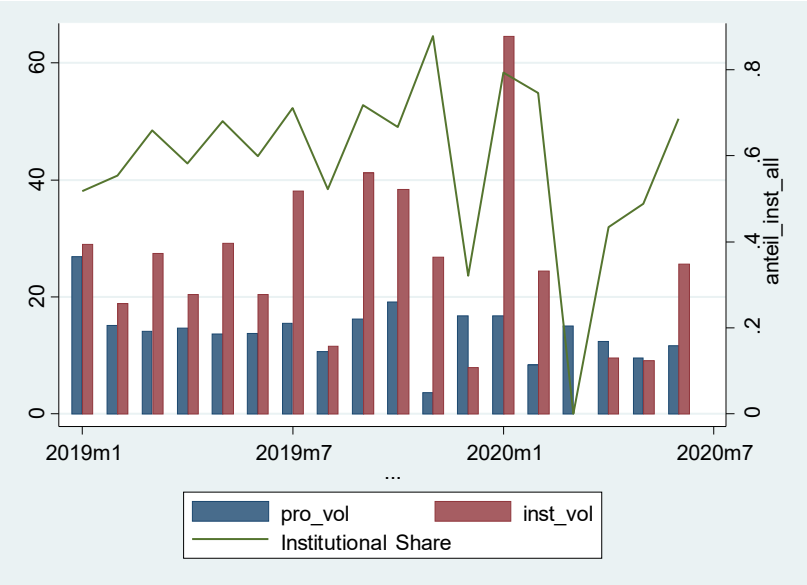
Motivation

During March 2020, when COVID-19 swept the globe …

…. the two primary market segments experienced strongly opposite dynamics.

… the LLI 100[2] bid price plunged by 12.81% and recovered in the following months, in line with the institutional primary market.



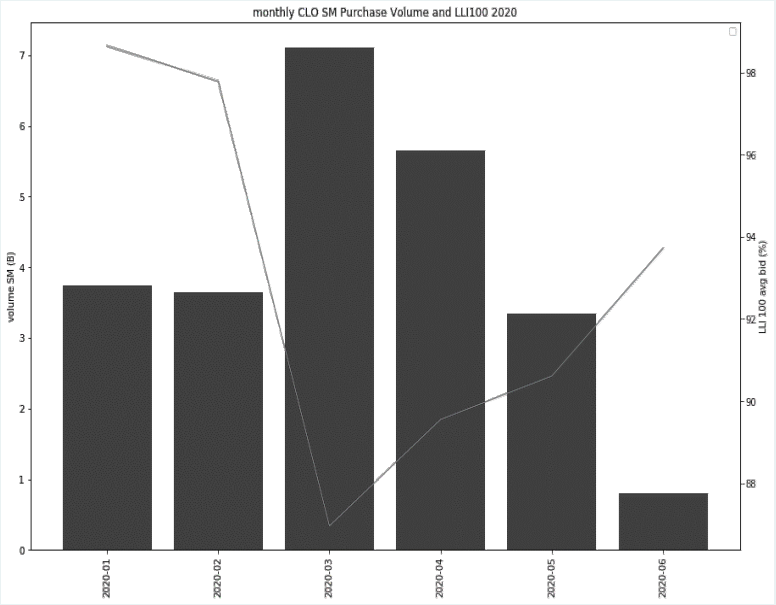
[1] Institutional Share = Inst. loan issuance / total loan issuance

[2] The secondary market price index of the 100 most liquid leveraged loans

Motivation

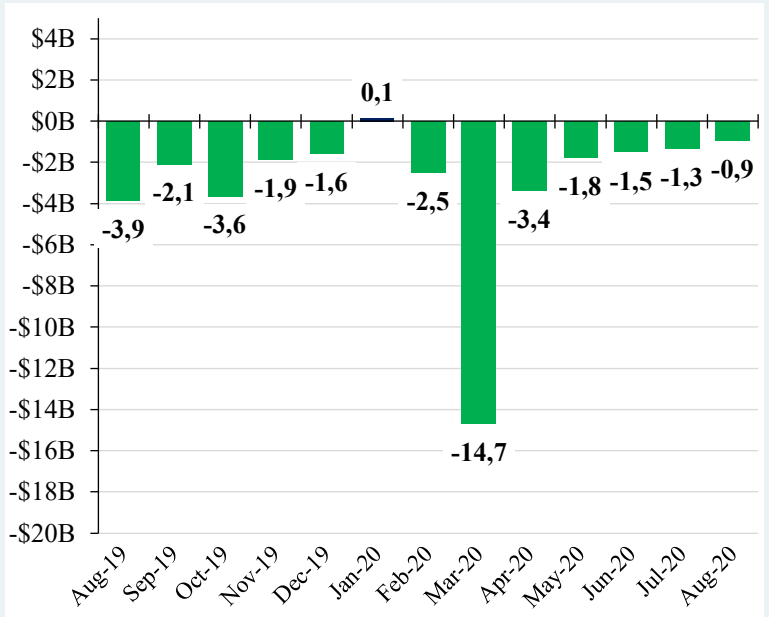
CLOs are asset insulators[1]: Due to their favorable liability structure …

…. CLOs were able to act counter-cyclical during the COVID-19 crisis …



CLO buying on the secondary market & average LLI100 bid quotes

… mutual funds were not.



Mutual fund net flows

[1] Chorodow-Reich et al. (2020)

Motivation

The anecdotal COVID-19 evidence is a case in point for the lending versus trading theory[1] applied to non-bank institutions.

[1]Diamond and Rajan (2011) and Shleifer and Vishny (2010)

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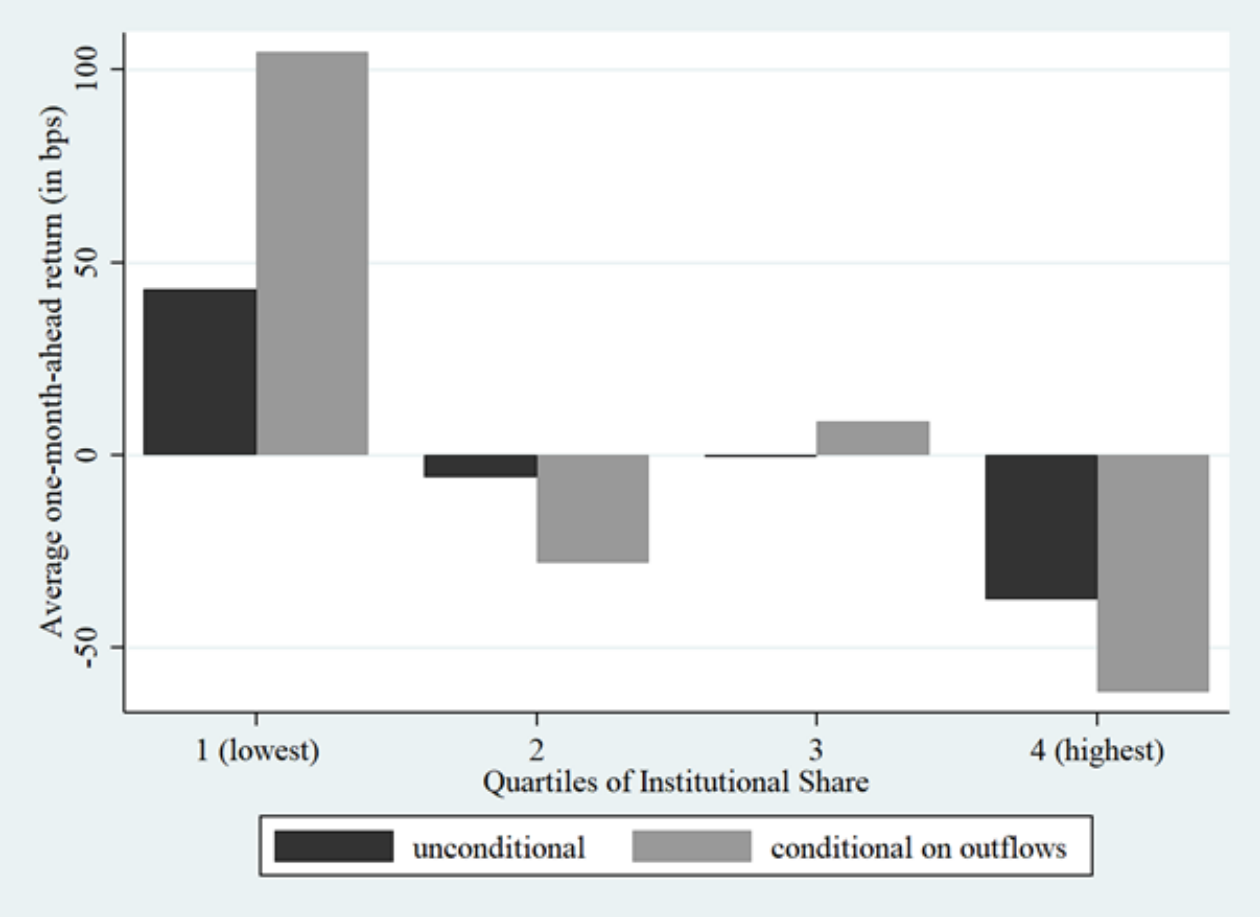
Main Result: Predictability of Loan Returns

Monthly *Institutional Share*[1] and the average one-month-ahead return of the LLI100[2] (univariate relation)



[1] Institutional Share = Inst. loan issuance / total loan issuance

[2] The secondary market price index of the 100 most liquid leveraged loans

Main Result: Predictability of Loan Returns

Predictive regressions of SM returns on lagged *Institutional Share* and control variables confirm the univariate relationship

	Dependent variable: LLI100 Price Return$_t$		
	(1)	(2)	(3)
Constant	0.012**	0.026*	-0.001
	(0.01)	(0.02)	(0.01)
Price Return$_{t-1}$	0.441***	0.448***	0.560***
	(0.16)	(0.16)	(0.15)
Institutional Share$_{t-1}$	-0.022**	-0.031***	-0.003
	(0.01)	(0.01)	(0.02)
Outflows$_{t-1}$			0.686***
			(0.25)
Outflows$_{t-1}$ x Inst. Share$_{t-1}$			-1.342***
			(0.43)
Controls	No	Yes	Yes
Adj. R^2	0.201	0.229	0.306
R^2 contribution	21.40%	16.50%	30.10%
Period	February 2000 – May 2020	February 2000 – May 2020	January 2001 – April 2020
N	244	244	232

Standard errors adjusted for heteroscedasticity and autocorrelation

Main Result: Predictability of Loan Returns

Robustness

	Dependent variable: LLI100 Price Return$_t$			
	Coeff.	(t)	Adj. R^2	N
(1) Baseline	-1.342***	(-3.09)	0.306	232
Panel A: Subsamples				
(2) January 2001 – August 2010	-0.348	(-0.73)	0.378	116
(3) September 2010 – April 2020	-1.499***	(-2.91)	0.216	116
(4) Ex. COVID (January 2001 – December 2019)	-0.611**	(-2.15)	0.327	228
Panel B: Controlling for the state of the credit cycle				
(5) Leveraged loan growth	-1.350***	(-3.11)	0.305	232
(6) Institutional loan growth	-1.428***	(-3.01)	0.32	230
(7) Pro rata loan growth	-1.341***	(-3.07)	0.303	232
(8) High-yield bond growth	-1.415***	(-3.40)	0.331	182
(9) Leveraged finance growth	-1.436***	(-3.74)	0.331	182
Panel C: Additional controls				
(10) Share of issuance rated B or below	-1.335***	(-3.07)	0.304	232
(11) Growth of issuance rated B or below	-1.354***	(-3.04)	0.305	232
(12) Leads/lags of one-month default rates	-1.376***	(-3.29)	0.325	232
(13) Interacting all controls with OUTFLOWS	-1.054***	-2.58	0.317	232
Panel D: Alternative return (or yield) series				
(14) BB return	-1.114***	(-3.38)	0.252	232
(15) B return	-1.374***	(-2.83)	0.297	232
(16) CCC return	-2.007**	(-2.36)	0.359	221
(17) ELLI return	-0.953**	(-2.07)	0.171	125
(18) Δ LLI 100 yield	0.262***	-3.09	0.23	218
Panel E: Alternative measures of Institutional Share				
(19) BB	-0.904**	(-2.24)	0.259	232
(20) B	-0.834**	(-2.13)	0.26	232
(21) NR	-1.129**	(-1.97)	0.25	232
Panel F: Alternative forecast horizons for LLI100 returns				
(22) Two-month cumulative returns	-2.085***	(-3.38)	0.303	231
(23) Three-month cumulative returns	-2.888***	(-3.73)	0.268	230
(24) Six-month cumulative returns	-2.745*	(-1.76)	0.201	227
(25) Nine-month cumulative returns	-4.606*	(-1.70)	0.258	224
(26) One-year cumulative returns	-6.790*	(-1.73)	0.384	221

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Mechanism: Lending vs. Trading[1]

If prices of institutional loans temporarily diverge from fundamentals, …

… the correction of this mispricing produces a negative relation between current relative institutional loan issuance and future price changes.

- Supply-side: Issuing institutions supply less (more) credit if buying loans on the secondary is relatively cheap (expensive).
- Demand-side: Borrowers demand less (more) institutional loans if their pricing is less (more) favorable than that of pro rata loans.

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)

Mechanism: Lending vs. Trading[1]

If prices of institutional loans temporarily diverge from fundamentals, …

… the correction of this mispricing produces a negative relation between current relative institutional loan issuance and future price changes.

- Supply-side: Issuing institutions supply less (more) credit if buying loans on the secondary is relatively cheap (expensive).

CLOs are asset-insulators[2] and act counter-cyclical if prices fall below fundamentals

- They will increase buying in market downs.
- In the absence of unlimited access to funding, increased buying comes with reduced lending.
- Implication: CLOs' aggregate *Lending Share*[3] correlates positively with contemporaneous market price movements.

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)
[2] Chorodow-Reich et al. (2020)
[3] The ratio of lending to total loan investments

Mechanism: Lending vs. Trading[1]

CLOs are asset-insulators and act counter-cyclical if prices fall below fundamentals

	Dependent variable: Δ Lending Share$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.033*	0.041*	0.058*	0.052*	0.074*	-0.277
	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.34)
Δ Lending Share$_{t-1}$		-0.188***	-0.353***	-0.187***	-0.204***	-0.229***
		(0.05)	(0.10)	(0.05)	(0.05)	(0.05)
Price Return$_t$	5.471***	5.752***				
	(2.08)	(2.25)				
Price Return$_{t-1}$			9.198**			
			(3.99)			
Min[0, Price Return$_t$]				6.921***	2.083	2.418
				(0.93)	(1.56)	(1.60)
Max[0, Price Return$_t$]				4.637	4.636	2.612
				(4.96)	(4.93)	(5.20)
Min[0, Flows$_t$]					4.072***	3.585***
					(1.27)	(1.36)
Max[0, Flows$_t$]					0.054	-0.648
					(1.19)	(1.34)
Controls	No	No	No	No	No	Yes
Adj. R^2	0.068	0.097	0.189	0.093	0.1	0.104
N	137	137	137	137	137	137

Relative primary vs. secondary market allocations should respond asymmetrically to market returns. [1]

CLOs may take advantage of outflow-induced fire selling by loan mutual funds and ETFs in market downs. [2]

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)
[2] Chorodow-Reich et al. (2020)
[3] The ratio of lending to total loan investments

Mechanism: Lending vs. Trading[1]

The drop in *Lending Share* is consistent with a decrease in lending when SM prices become cheap …

	Dependent variable: Δ PM Volume$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.142***	0.172***	0.165***	0.198***	0.170**	-0.25
	(0.05)	(0.06)	(0.05)	(0.07)	(0.08)	(0.49)
Δ PM Volume$_{t-1}$		-0.195***	-0.228***	-0.198***	-0.232***	-0.243***
		(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
Price Return$_t$	5.649**	6.146**				
	(2.48)	(2.67)				
Price Return$_{t-1}$			11.251**			
			(5.20)			
Min[0, Price Return$_t$]				8.819***	-1.108	-0.357
				(2.41)	(2.46)	(2.75)
Max[0, Price Return$_t$]				3.619	3.146	0.076
				(6.13)	(5.74)	(7.16)
Min[0, Flows$_t$]					7.449***	6.816***
					(2.36)	(2.50)
Max[0, Flows$_t$]					4.352	3.502
					(3.09)	(3.47)
Controls	No	No	No	No	No	Yes
Adj. R^2	0.016	0.047	0.112	0.044	0.088	0.077
N	137	137	137	137	137	137

Relative primary vs. secondary market allocations should respond asymmetrically to market returns. [1]

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[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)

[2] e.g. Coval and Stafford (2007)

Standard errors adjusted for heteroscedasticity and autocorrelation

Mechanism: Lending vs. Trading[1]

… while buying on the secondary market increases.

	Dependent variable: Δ SM Volume$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.045***	0.054***	0.042***	0.015	0.006	-0.014
	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.13)
Δ SM Volume$_{t-1}$		-0.239***	-0.227***	-0.221***	-0.219***	-0.225***
		(0.08)	(0.08)	(0.07)	(0.07)	(0.07)
Price Return$_t$	-3.347*	-3.101*				
	(1.97)	(1.89)				
Price Return$_{t-1}$			-0.937			
			(0.90)			
Min[0, Price Return$_t$]				-7.068***	-7.301***	-7.206***
				(0.60)	(1.45)	(1.56)
Max[0, Price Return$_t$]				0.632	0.578	1.036
				(1.16)	(1.16)	(1.37)
Min[0, Flows$_t$]					0.066	-0.437
					(1.31)	(1.33)
Max[0, Flows$_t$]					0.532	0.034
					(0.60)	(0.61)
Controls	No	No	No	No	No	Yes
Adj. R^2	0.065	0.114	0.031	0.179	0.169	0.17
N	137	137	137	137	137	137

Relative primary vs. secondary market allocations should respond asymmetrically to market returns. [1]

CLOs may take advantage of outflow-induced fire selling by loan mutual funds and ETFs in market downs. [2]

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)

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Standard errors adjusted for heteroscedasticity and autocorrelation

Mechanism: Lending vs. Trading[1]

Banks neither significantly increase nor decrease lending in response to trading opportunities on the secondary market.

	Dependent variable: Δ Pro Rata Volume$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.234***	0.311***	0.306***	0.308***	0.260***	0.355
	(0.06)	(0.06)	(0.06)	(0.07)	(0.08)	(0.31)
Δ Pro Rata Volume$_{t-1}$		-0.335***	-0.332***	-0.335***	-0.340***	-0.341***
		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Price Return$_t$	1.729	2.446				
	(2.98)	(2.75)				
Price Return$_{t-1}$			-1.176			
			(3.05)			
Min[0, Price Return$_t$]				2.267	4.644	4.81
				(3.47)	(3.82)	(4.43)
Max[0, Price Return$_t$]				2.811	2.531	2.496
				(5.14)	(5.21)	(6.15)
Min[0, Flows$_t$]					-4.48	-4.601
					(4.17)	(4.15)
Max[0, Flows$_t$]					1.391	2.13
					(2.27)	(2.33)
Controls	No	No	No	No	No	Yes
Adj. R^2	-0.003	0.106	0.104	0.103	0.105	0.096
N	245	245	245	245	232	232

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)

[2] e.g. Coval and Stafford (2007)

Standard errors adjusted for heteroscedasticity and autocorrelation

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Corporate Finance Implications

Is less institutional credit available and at worse terms (higher spreads, shorter maturities) when secondary loan market prices are depressed?

- We exploit a "quasi-natural experiment" to control for all observed and unobserved time-varying borrower characteristics (e.g., credit demand):

$$pm\_feature^{f}_{k,i,t} = \beta_0 + \beta_1 * institutional_{k,i,t} + \beta_2 * avg\_bid\_price_t + \beta_3 * institutional_{k,i,t} * avg\_bid\_price_t + \gamma_{i,t} + e_{k,i,t}$$

We compare

- differences in price (spread) and non-price (loan amount, maturity) features f
- between the pro rata and institutional facility types k
- of the same issuer i
- and the same point in time t

as a response to different secondary loan market price levels.

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)
[2] Chorodow-Reich et al. (2020)

Corporate Finance Implications

Fixed effects regressions of facility characteristics on the LLI100 price level, facility type dummies and their interaction

	Facilities within same quarter			Facilities of one loan package		
Dependent variable	spread (bps)	amount (M)	term (years)	spread (bps)	amount (M)	term (years)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	333.32	3240.89	4.88*	507.91***	168.8074***	4.89***
	(434.52)	(3421.34)	(2.13)	(1.28)	(5.42)	(0.00)
Inst. dummy	433.62***	-817.52***	-2.48***	422.42***	-823.50***	-2.56***
	(77.07)	(199.04)	(0.33)	(76.69)	(197.06)	(0.33)
Price	1.81	-31.98	0.00	0.00	0.00	0.00
	(4.53)	(35.67)	(0.02)	.	.	.
Inst. dummy x Price	-5.30***	12.71***	0.041***	-5.19***	12.78***	0.04***
	(0.81)	(2.10)	(0.00)	(0.80)	(2.07)	(0.00)
Issuer x Quarter FE	Yes	Yes	Yes	No	No	No
Loan Package FE	No	No	No	Yes	Yes	Yes
Adj. R^2	0.594	0.466	0.808	0.595	0.467	0.816
N	11565	8092	11658	11389	7947	11482

Standard errors clustered by issuer

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Conclusion

I. *Institutional Share* is a strong, robust predictor of loan returns.

II. In line with the lending vs. trading theory[1], the predictive ability of institutional lending is limited to months when loan mutual funds face net outflows.

III. CLOs are ideally suited as secondary market price insulators[2] and to buy up the fire sales of loan mutual funds. Due to funding restrictions, more buying in the secondary market necessarily comes with a contraction of credit supply to the real sector.

Or:

Mixing apples and oranges promotes the fragility of credit supply by shadow banks.

[1] Diamond and Rajan (2011) and Shleifer and Vishny (2010)
[2] Chorodow-Reich et al. (2020)

Literature

Chodorow-Reich, Andra Ghent Gabriel, and Valentin Haddad. Forthcoming. “Asset Insulators.” *Review of Financial Studies*.

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