

Wholesale funding dry-ups

Christophe Pérignon

David Thesmar

Guillaume Vuilleme

HEC Paris

MIT

HEC Paris

Swissquote conference

EPFL

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Wholesale funding:

- **A growing source of bank funding**
 - Repurchase agreements, interbank loans, certificates of deposit

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- **Penalized by new liquidity regulation (LCR, NSFR)**

- **Aggregate resilience of unsecured markets**

- U.S.: Schoar et al. (2011)
- Europe: Gabrieli & Georg (2015)

- **Aggregate resilience of secured markets**

- U.S.: Krishnamurthy et al. (2014), Copeland et al. (2014)
- Europe: Boissel et al. (2015), Mancini et al. (2015)

- **Our focus:** Beyond aggregate, explore cross-section

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 - Debt derives value from being information-insensitive
 - When information-sensitive: uninformed lenders cut funding
 - Informed lenders still lend to high-quality banks
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- **Test competing theories**
 - Ideal laboratory: European market for certificates of deposits (CDs)
 - Different policy implications: transparency vs. opacity

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- **R2: Low-quality banks are more likely to lose access to wholesale funding in times of stress**
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- **R1: No market-wide freeze**
 - But many bank-specific funding dry-ups

- **R2: Low-quality banks are more likely to lose access to wholesale funding in times of stress**
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- **R3: In times of stress, funds are reallocated towards high-quality banks**
 - Inconsistent with adverse selection
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■ Certificate of deposit (CD)

- Issued by credit institutions
- Initial maturity between 1 day and 1 year (median = 33 days)
- Unsecured
- Issued over-the-counter, placed mostly to money market funds

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■ CD dataset

- From Banque de France, over 2008-2014
- 1,383,202 ISIN-level observations, with 838,703 individual ISINs
- All events: issuance, re-issuances, buybacks

■ Certificate of deposit (CD)

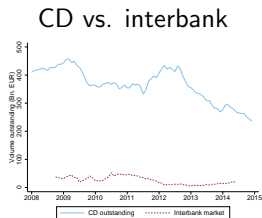
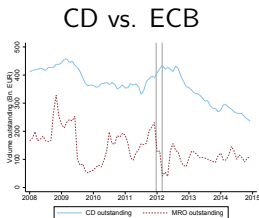
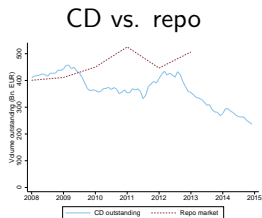
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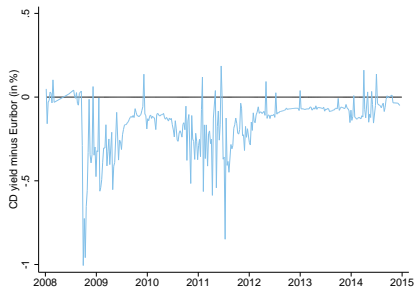
■ More than 80% of all euro-denominated CDs

CD market versus other wholesale markets

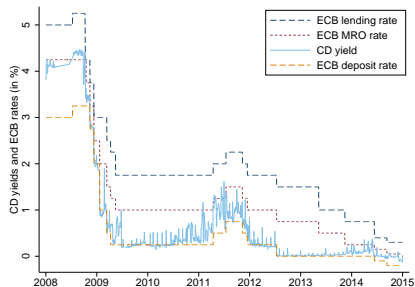


- CD is a large segment of wholesale funding
 - Similar size as the repo market
 - Larger than ECB funding and unsecured interbank market
 - No previous study on the CD market

CD yields vs. Euribor

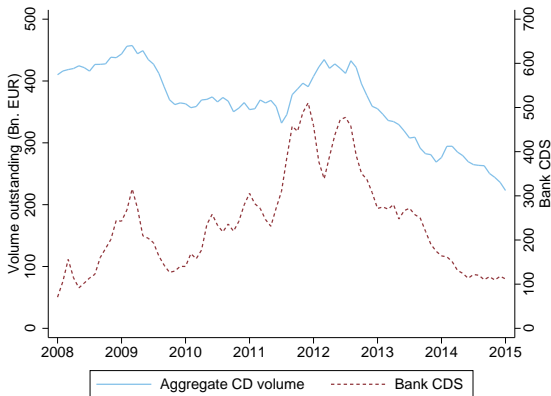


CD yields vs. ECB MRO rate



- CDs are cheaper than close substitutes

- **R1: No market-wide freeze in CD market**
 - ... even when CDS spreads increase



■ CD issuers

- 276 individual issuers
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■ **Matching with balance sheet and market data**

- 263 issuers matched with balance sheet data (Bankscope)
- Short-term credit ratings (Fitch)
- Stock price and CDS spread data (Bloomberg)

The importance of bank-specific dry-ups

- **Definitions of funding dry-ups**
 - Full dry-up: Amount outstanding falls to zero
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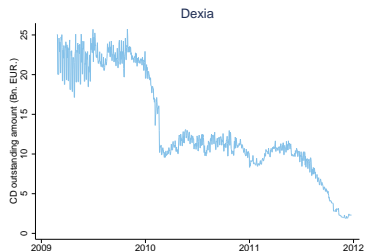
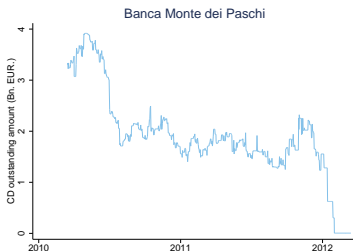
- **75 events, including 29 full dry-ups**

■ Definitions of funding dry-ups

- Full dry-up: Amount outstanding falls to zero
- Partial dry-up: Loses 50% or more in 50 days or less

■ 75 events, including 29 full dry-ups

■ One full and one partial dry-up



- Banks facing a funding dry-up are weaker on observables

	One year before event	
	Diff. from mean	Diff. from median
ROA	-1.249***	-0.577***
Net income / Assets	-0.014***	-0.006***
Impaired loans / Equity	55.879***	52.790***
Equity / Assets	-0.036***	-0.033***
CDS spread	82.180	110.245**
Short-term credit rating	-0.424***	-0.474**

- **R2:** Low-quality banks are more likely to lose access to wholesale funding in times of stress
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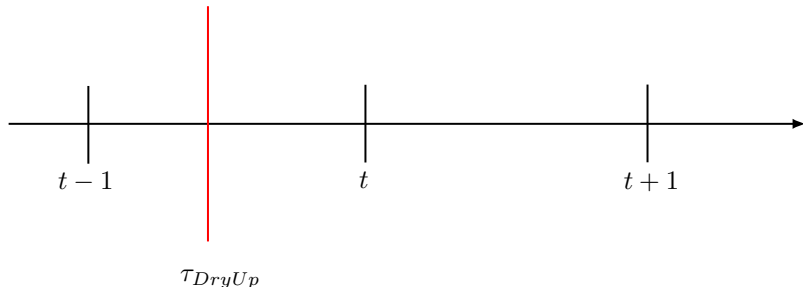
■ Base regression

$$\Delta ROA_{i,t} = \beta_0 \mathbb{1}\{t-1 \leq \tau_{DryUp_i} < t\} + \beta_1 \text{Size}_{i,t-1} + \beta_2 \text{Controls}_{i,t-1} + \beta_3 \text{Controls}_{c,t-1} + FE_c + FE_t + \varepsilon_{i,t}$$

- $\Delta ROA_{it} = ROA_{it} - ROA_{it-1}$
- Coefficient of interest: β_0

Dry-ups predict future bank characteristics

$$\Delta ROA_t = ROA_t - ROA_{t-1}$$



Dry-ups predict future bank characteristics

- Facing a dry-up predicts a decrease in ROA
 - Inconsistent with adverse selection being large

Dependent variable: $\Delta ROA = ROA_t - ROA_{t-1}$

	Baseline		Share CD	Crisis
DryUp	-0.341** (0.135)	-0.508*** (0.139)	-0.874*** (0.176)	-0.610*** (0.143)
Size _{t-1}		-0.018 (0.025)	-0.004 (0.025)	-0.017 (0.025)
ROA _{t-1}		-0.713*** (0.038)	-0.717*** (0.037)	-0.717*** (0.038)
Impaired / Loans _{t-1}		-0.025*** (0.009)	-0.026*** (0.009)	-0.026*** (0.009)
GDP growth		38.957*** (4.969)	37.561*** (4.955)	38.732*** (4.954)
DryUp * Share CD ∈ [4%, 9%]			0.372 (0.407)	
DryUp * Share CD ≥ 9%			0.351 (0.302)	
DryUp * Crisis				0.133 (0.192)
Adj. R ²	-0.001	0.407	0.415	0.411
N. Obs.	948	684	684	684

Dry-ups predict future market outcomes

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- Use market data \rightarrow Incorporate information in real time
 - Dry-ups predict increases in CDS spreads
 - Also predict negative excess stock return, but insignificant

Δ CDS spread

	6 months		1 year	
DryUp	36.443** (15.748)	49.033*** (17.577)	43.824* (25.510)	61.896** (28.891)
Size _{t-1}		-0.707 (0.901)		-1.680 (1.770)
ROA _{t-1}		-2.354 (1.552)		3.948 (2.756)
Impaired / Loans _{t-1}		-2.041** (0.787)		-2.410** (1.180)
GDP growth		-1214.823* (650.329)		-2187.64 (1437.262)
Adj. R ²	0.570	0.585	0.563	0.573
N. Obs.	2,099	956	1,937	956

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- **Three solutions**
 - Use changes in impaired loans as dependent variable → [\[See results\]](#)
 - Interact *DryUp* dummy with share of CD funding → [\[See results\]](#)
 - Banks do not downsize significantly → No fire sales [\[See results\]](#)

- Uninformed lenders value information-insensitive securities
 - In stress, long-term debt becomes information-sensitive first
 - Predicts maturity shortening before dry-ups

Dependent variable:
Weighted average maturity of new issues

	<i>Panel A: Partial and full dry-ups</i>	<i>Panel B: Full dry-ups only</i>
$\tau - 1$	-24.660*** (2.281)	-29.732*** (4.521)
$\tau - 2$	-17.278*** (3.939)	-30.198*** (6.004)
$\tau - 3$	-12.134*** (1.699)	-14.664*** (4.742)
$\tau - 4$	-7.628 (4.902)	-11.610 (7.368)
$\tau - 5$	-7.506* (3.750)	-3.930 (5.243)
$\tau - 6$	-0.689 (4.132)	15.504*** (3.858)
Adj. R^2	0.166	0.165
N. Obs.	11,420	11,420

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- **Issuance in excess of the market**

$$E_{i,t} = \left[\log(CD_{i,t}) - \log(CD_{i,t-1}) \right] - \left[\log(CD_{m,t}) - \log(CD_{m,t-1}) \right]$$

- CD_{it} : Outstanding amount by i in month t
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- **Probit specification**

$$\Pr(I_{i,t} = 1 | X_t) = \Phi(\beta_0 \Delta ROA_{i,t} + \beta_1 \text{Controls}_{i,t-1} + \beta_2 \text{Controls}_{c,t-1} + FE_c + FE_m)$$

- $I_{it} = 1$ if E_{it} above median or 75th percentile

- **Banks increasing ROA increase relative CD funding**
 - ... Regardless of whether market is stressed

Dependent variable:
Prob. of CD issuance in excess of the market

	Above median	Above 75th percentile
Δ ROA	0.024*** (0.005)	0.031** (0.014)
Controls	Yes	Yes
Month FE	Yes	Yes
Country FE	Yes	Yes
N. Obs.	10,979	10,979

■ Stress Index

$$\text{Stress Index}_t = \frac{\sum_i R_{i,t}}{CD_{m,t}},$$

- R_{it} : Euro amount of dry-up by i at t
- CD_{mt} : Aggregate CD market size at t
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■ Interact ΔROA with quantiles of Stress Index

- If effect magnified → Accelerated reallocation
- If effect disappears → Adverse selection worsens

■ Reallocation magnified when market stress is high

- ... Increasing in quantiles of the Stress Index

	Dependent variable: Prob. of CD issuance in excess of the market			
	Above median		Above 75th percentile	
Δ ROA	0.024*** (0.005)	0.018** (0.009)	0.031** (0.014)	0.016*** (0.006)
Δ ROA * Stress Index in Quartile 2		-0.003 (0.016)		0.008 (0.006)
Δ ROA * Stress Index in Quartile 3		0.033*** (0.012)		0.039 (0.033)
Δ ROA * Stress Index in Quartile 4		0.048** (0.020)		0.030** (0.015)
Controls	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
N. Obs.	10,979	10,979	10,979	10,979

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Month FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
N. Obs.	10,979	10,979	10,979	10,979

- High-quality banks do not reduce but *increase* funding

- Inconsistent with adverse selection being first-order

- **Frictions on wholesale funding markets**
 - No evidence that asymmetric information is first-order
 - No market freeze
 - Dry-ups predict low future performance
 - Investors value information-insensitive (“safe”) securities
 - Dry-ups occur when debt turns information-sensitive
 - Reallocation not random → From low- to high-quality banks

■ Frictions on wholesale funding markets

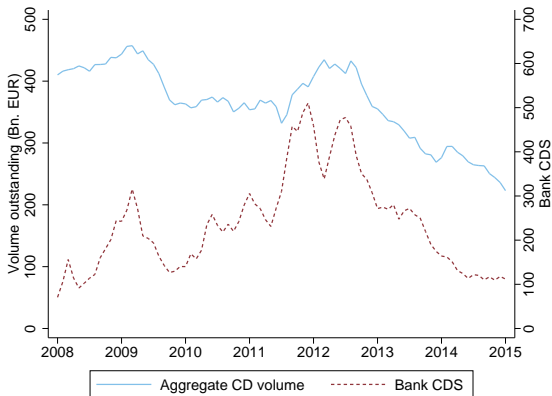
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■ Implications of our results

- Disciplinary role of wholesale funding (“tough creditors”)
- Challenge to liquidity ratios?... No account for externalities
- Lender of last resort most likely to benefit weakest banks
- Private production of safe assets

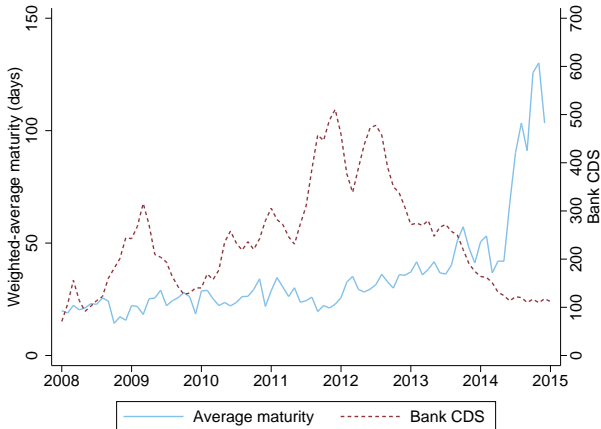
The absence of market freeze

- No system-wide drop in volume
 - ... Even when CDS spreads increase

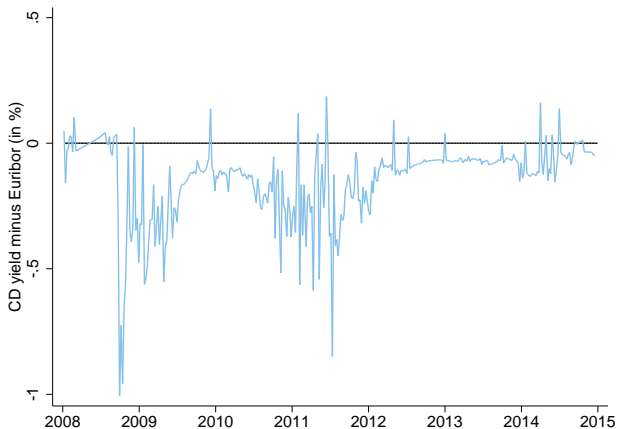


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- No system-wide drop in average maturity

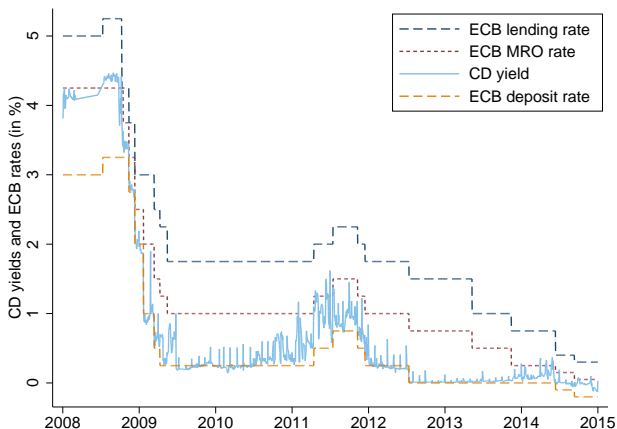


- Negative spread with the Euribor of same maturity



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■ Yields on CDs with initial maturity up to 7 days



[Back](#)

■ Facing a dry-up predicts an increase in impaired loans

Dependent variable: Δ Impaired loans / Loans

	Baseline		Share CD	Crisis
DryUp	0.582*** (0.139)	0.507*** (0.138)	0.640*** (0.177)	0.612*** (0.151)
Size _{t-1}		-0.038 (0.025)	-0.042* (0.025)	-0.040 (0.025)
ROA _{t-1}		-0.011 (0.038)	-0.010 (0.038)	-0.007 (0.038)
Impaired / Loans _{t-1}		-0.017* (0.009)	-0.017* (0.009)	-0.017* (0.009)
GDP growth		-24.918*** (5.044)	-24.463*** (5.068)	-24.706*** (5.031)
DryUp * Share CD $\in [4\%, 9\%]$			-0.490 (0.385)	
DryUp * Share CD $\geq 9\%$			-0.233 (0.306)	
DryUp * Crisis				-0.052 (0.093)
Adj. R^2	0.100	0.140	0.140	0.145
N. Obs.	676	675	675	675

■ Effect not magnified for banks with large CD exposure

Dependent variable: $\Delta ROA = ROA_t - ROA_{t-1}$

	Baseline		Share CD	Crisis
DryUp	-0.341** (0.135)	-0.508*** (0.139)	-0.874*** (0.176)	-0.610*** (0.143)
Size _{t-1}		-0.018 (0.025)	-0.004 (0.025)	-0.017 (0.025)
ROA _{t-1}		-0.713*** (0.038)	-0.717*** (0.037)	-0.717*** (0.038)
Impaired / Loans _{t-1}		-0.025*** (0.009)	-0.026*** (0.009)	-0.026*** (0.009)
GDP growth		38.957*** (4.969)	37.561*** (4.955)	38.732*** (4.954)
DryUp * Share CD ∈ [4%, 9%]			0.372 (0.407)	
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DryUp * Crisis				0.133 (0.192)
Adj. R ²	-0.001	0.407	0.415	0.411
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■ Facing a dry-up does not predict a decrease in size

Dependent variable: Δ Size

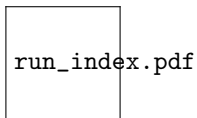
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DryUp	-0.039 (0.035)	-0.014 (0.013)	-0.008 (0.017)	-0.019 (0.018)
Size _{t-1}		-0.005** (0.003)	-0.005** (0.002)	-0.005** (0.002)
ROA _{t-1}		0.008** (0.003)	0.008** (0.003)	0.008** (0.003)
Impaired / Loans _{t-1}		-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
GDP growth		0.028 (0.497)	0.054 (0.500)	0.014 (0.497)
DryUp * Share CD \in [4%, 9%]			-0.009 (0.041)	
DryUp * Share CD \geq 9%			-0.017 (0.030)	
DryUp * Crisis				0.008 (0.007)
Adj. R ²	0.031	0.197	0.195	0.198
N. Obs.	950	685	685	685

■ Predictability remains when market stress is high

Dependent variable: $\Delta ROA = ROA_t - ROA_{t-1}$

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- **Captures number and magnitude of dry-ups**
 - Both partial and full



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