Nonbanks and the Transmission of Monetary Policy

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Motivation

The financing structure of the euro area economy has evolved since the global financial crisis (GFC) with nonbank financial intermediation taking a more prominent role. This shift affects the transmission of monetary policy. (ECB Strategy Review, 2021)

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- Rise of nonbank intermediaries in many parts of the world, especially since GFC
  - US: Nonbanks important provider of credit to publicly-traded firms (Chernenko, Erel and Prilmeier, 2020) and to small businesses (Gopal and Schnabl, 2020)
- Conflicting predictions about how they affect monetary transmission
  - Bank lending channel: monetary policy "gets in all cracks" by affecting funding cost of all intermediaries who borrow short-term (Stein, 2013)
  - Recent evidence: monetary tightening shifts supply of credit from banks to nonbanks (Drechsler, Savov and Schnabl, 2017, Elliott et al., 2021, and Xiao, 2020)

Research questions

- We study how nonbanks affect the transmission of monetary policy in corporate and consumer credit markets
- Answer three main research questions:
  1. Does a tightening of monetary policy change the composition of credit supply by shifting credit from banks to nonbanks?
  2. What is the mechanism driving the differential response of credit supply by nonbanks vis-a-vis banks to monetary policy shocks?
  3. How does the substitution into more nonbank lending affect the transmission of monetary policy to financial and real outcomes (e.g. corporate investment and household consumption)?

Our approach

- Analyze universe of unsecured credit extended by banks and nonbanks in Denmark to firms and households between 2003 and 2018
- Use euro area monetary policy shocks as proxies for changes in interest rates (Danish krona pegged to Euro)
- Control for credit demand by comparing loans by banks and nonbanks to the same borrower in the same year (Khwaja and Mian, 2008)
- Combine loan-level data with:
  1. lender balance sheet information on banks and nonbanks to study the mechanism driving our results
  2. firm balance sheet information and tax records on every household in DK to study real effects

Preview of results

After a one standard deviation size shock to monetary policy (tightening), nonbanks...

- increase their share in credit supply to both firms and households by ca. 5%
  - Effect mostly driven by intensive margin
- are able to raise long-term (debt) financing
  - Nonbanks financing their operations largely with long-term debt drive the lending expansion
- attenuate the monetary transmission by lending more to firms and households, allowing those with nonbank ties to sustain investment and consumption after a rate hike
  - Nonbanks almost fully eliminate the (credit supply-side) transmission to corporate real outcomes
  - Aggregate results: (firms in) industries with larger nonbank presence insulated from contractions

Literature

- Changes in monetary policy affect credit market outcomes
  - Kashyap and Stein (2000), Jiménez et al. (2012), Jiménez et al. (2014), and Heider, Saidi and Schepens (2019) among many others
  - Elliott et al. (2021) document increased risk-taking by nonbanks after a monetary tightening in US syndicated loans and car loans
  - **Contribution:** evidence from Europe; direct evidence linking MP, lenders' funding and credit supply; transmission to real outcomes;
- Studies of monetary policy's real effects using micro data
  - Di Maggio et al. (2017), Cloyne et al. (2018), Wong (2019), Cloyne, Ferreira and Surico (2020), and Holm, Paul and Tischbirek (2021)
- Increasing role of nonbank financial intermediaries in various credit markets
  - Buchak et al. (2018), Fuster et al. (2019), Murfin and Pratt (2019), Irani et al. (2021), and Chernenko, Erel and Prilmeier (2020)

Data

- Annual data from the Danish Tax Agency on the universe of unsecured credit extended between 2003 and 2018 to non-financial firms (NFCs) and individuals
  - Account-level data: credit balance at year end and total interest paid over past year
  - Cannot distinguish between credit products (term loans, credit card debt, commercial paper etc.)

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- Data on borrower and lender characteristics:
  - Borrowers: balance sheets, income statements, location, sociodemographics..
  - lenders: industry codes distinguish banks (deposit-taking) from nonbanks (non deposit-taking financial companies); balance sheet data from commercial data provider

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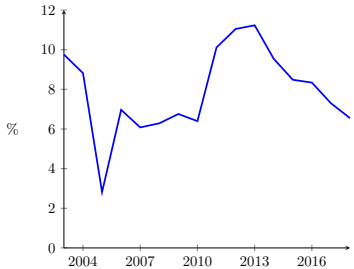
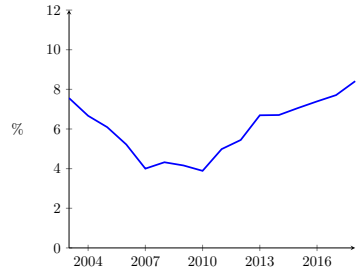
  - lenders: industry codes distinguish banks (deposit-taking) from nonbanks (non deposit-taking financial companies); balance sheet data from commercial data provider
- Proxy for size of monetary policy shocks based on euro area monetary policy shocks from Jarocinski and Karadi (2019)
  - Exogenous variation: DN imports ECBs' monetary policy decisions due to currency peg

Share of nonbank credit in total unsecured credit



(a) Corporate credit



(b) Consumer credit

- Unsecured credit in DK equivalent to ca. 50% of GDP
- Between 2003-2018 nonbank credit accounts for ca. 8% of unsecured credit
- Main nonbank types: specialized finance companies (shipping), consumer credit, leasing, wealth managers

Identification - Monetary policy and credit supply

1. Endogeneity of monetary policy
   - Policy rates may be anticipated by market participants and driven by local lending conditions
   - We exploit Denmarks' currency peg to the Euro, which gives us exogenous variation as Denmark imports ECB-policy, which is decided with no regard to the economic conditions in Denmark (Andersen et al., 2021; Jiménez et al., 2012)

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2. Disentangling credit demand and supply
   - Include granular borrower-level controls to capture credit demand with borrower-year fixed effects as in Khwaja and Mian (2008)
   - We compare lending terms to borrowers who, in a given year after a monetary policy shock, receive credit from at least one bank and nonbank
   - Robustness: include borrowers with single lender-type by creating borrower-types based on industry-location-size-year (ILST) as in Degryse et al. (2019)

Shifts in credit supply composition

- Q1: Does a tightening of monetary policy change the composition of credit supply by shifting loans from banks to nonbanks?
- Empirical specification:

$$y_{b,l,t} = \alpha_{b,t} + \delta_l + \beta(\text{Nonbank}_l \times \text{MP Shock}_{t-1}) + \theta(\text{Nonbank}_l \times \text{Macro Controls}_{t-1}) + \varepsilon_{b,l,t} \quad (1)$$

  - the dependent variable is log of debt (or interest rate) by borrower b to lender l in year t
  - $\alpha_{b,t}$ are borrower-time fixed effects, capturing borrower demand as in Khwaja and Mian (2008)
  - δ_l are a lender fixed effects, capturing lenders' business model
  - $\text{Nonbank}_{l,t}$ is a dummy equal to 1 if lender l in year t is a nonbank
  - MP Shock_{t-1} is the cumulative sum of euro area monetary policy shocks
  - $\text{Macro Controls}_{t-1}$ are a set of macroeconomic controls for DK (GDP growth and forecast, inflation) and a measure of financial volatility (VIX)

Results: Shift in credit composition

	Corporate Credit		Consumer Credit	
Outcome var: Log debt				
Nonbank x MP Shock	4.09***	1.85**	5.77***	6.18***
	(1.51)	(0.94)	(0.12)	(0.08)
Observations	275,516	642,213	16,171,885	28,730,149
R2	0.65	0.40	0.54	0.26
Macro Var. Interactions	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes		Yes	
ILST FE		Yes		Yes

Note: * for $p < .1$, ** for $p < .05$, and *** for $p < .01$

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- One SD size shock to monetary policy increases share of nonbank debt in total unsecured corporate credit by 4% and by roughly 6% in consumer credit
- Results driven by *intensive* margin: no economically meaningful effect on new lending relationships
- Interest rates: no economically significant effect on the relative price of nonbank credit

Exploring the mechanism

- Why do nonbanks react differently to monetary policy compared to banks?
- Literature has found suggestive evidence that channel may work through lenders' funding
  - Xiao (2020) and Elliott et al. (2021): indirect evidence showing that MP tightening leads to inflows of funds into money market mutual funds, which provide (short-term) funding to nonbanks in US syndicated loan market (HFs & IBs)
  - Jiang (2019) and Agarwal, Hu and Zheng (2022): nonbank mortgage originators in the US obtain warehouse credit lines from traditional banks

Monetary policy, lenders' funding, and credit supply

1. Monetary policy affects the availability of various funding types for banks and nonbanks differently:

$$\Delta \text{Funding}_{l,t} = \alpha_l + \beta \text{MP Shock}_{t-1} + \theta \text{Macro Controls}_{t-1} + \varepsilon_{l,t}, \tag{2}$$

   - the dependent variable is the annual growth rate of lender l's funding in year t
   - In separate regressions for banks and nonbanks, we vary the *Funding* variable to denote: equity, short- and long-term debt, and long-term funding

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2. Lenders' funding structure is crucial for the response of credit supply to monetary policy:

$$\begin{aligned}\log(\text{credit})_{b,l,t} =& \alpha_{b,t} + \delta_l + \beta\text{MP Shock}_{t-1} + \eta\text{Funding ratio}_{l,t-1} + \theta\text{Macro Controls}_{t-1} \\ &+ \gamma\left(\text{MP Shock}_{t-1} \times \text{Funding ratio}_{l,t-1}\right) + \varepsilon_{b,l,t}.\end{aligned} \tag{3}$$

   - In separate regressions for banks and nonbanks, *Funding ratio* denotes lenders' ratio of equity, short- and long-term debt, and long-term funding to total assets

Reaction of lenders' funding to MP

	(1) Equity	(2) Short-term debt	(3) Long-term debt	(4) Long-term funding
A. Banks				
MP Shock	0.03***	0.01	-0.14***	-0.01
	(0.01)	(0.02)	(0.02)	(0.02)
Observations	1,517	1,514	1,044	1,514
R2	0.20	0.18	0.16	0.12
B. Nonbanks				
MP Shock	0.04***	0.04	0.11***	0.05***
	(0.01)	(0.05)	(0.04)	(0.02)
Observations	3,181	3,164	1,114	3,174
R2	0.17	0.14	0.20	0.14
Macro Controls	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Lender Cluster	Yes	Yes	Yes	Yes

Notes: Outcome variables are annual growth rates of the respective funding variables indicated in column titles. "Long-term funding" is calculated as the difference between "Total assets" and "Short-term debt", other variables are directly observed in the balance sheet data.

- An unexpected monetary tightening leads to an increase in long-term funding among nonbanks (decrease for banks)
- Different from existing results in the literature focusing on role of short-term funding

Funding structure shapes lending response to MP

	(1) Equity/TA	(2) STdebt/TA	(3) LTdebt/TA	(4) LT funding/TA
A. Corporate credit				
MP Shock x Funding ratio	-5.36	-7.88	39.22***	8.56
	(15.64)	(5.27)	(17.02)	(6.21)
Observations	9,939	9,939	2,171	9,939
R2	0.83	0.83	0.75	0.83
B. Consumer credit				
MP Shock x Funding ratio	4.54***	-7.52***	4.35***	8.13***
	(0.99)	(0.34)	(0.55)	(0.39)
Observations	2,217,765	2,217,765	1,244,472	2,217,765
R2	0.63	0.63	0.64	0.63
Macro Var. Interactions	Yes	Yes	Yes	Yes
Lower level Interactions	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes	Yes	Yes	Yes

Notes: "Funding ratio" varies across columns (see column titles). Loan-level regressions using only nonbank lenders.

- Nonbanks relying on long-term (debt) financing drive the lending expansion
- Nonbanks relying more on short-term debt appear to react more similarly to traditional banks

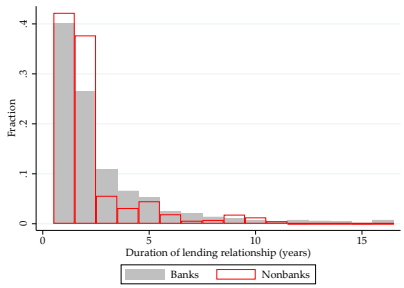
Conceptual framework: duration gaps shape funding responses to MP

- Duration gap: difference between weighted average duration of assets and that of liabilities
  - Banks: lend long, borrow short $\rightarrow$ positive duration gap
  - Nonbanks: lend short, borrow long $\rightarrow$ negative gap (Ozdagli & Wang, 2019; Koijen & Yogo, 2022)
- Rate hikes increase intermediaries' net worth if duration gap < 0 (Mishkin and Eakins, 2012)

$$\frac{\Delta \textit{Net worth}}{\textit{Total assets}} \approx -DUR_{gap} \times \frac{\Delta i}{1+i} \tag{4}$$

1. Neg. duration nonbanks experience increase in net worth (market val. of equity) after rate hike
2. Nonbank owners' "skin in the game" $\uparrow \implies$ nonbanks become relatively less risky $\implies$ funding cost $\downarrow$
3. Nonbanks raise additional funding, allowing them to increase lending & capture market shares from banks

Nonbank lending relationships are shorter



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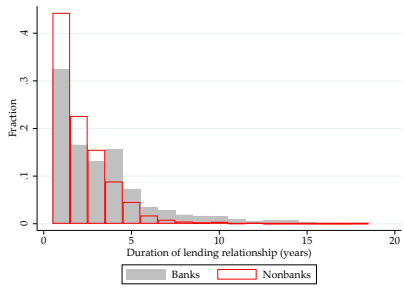

(b) Consumer credit

Borrower-level effects

- After studying monetary policy's effect on the *share* of nonbank credit supply, we now turn to the borrower-level effects by aggregating data to borrower-year level
- How do nonbanks affect monetary policy transmission to total credit supply?

$$\log(y_{b,t}) = \alpha_b + \beta \text{MP Shock}_{t-1} + \theta \text{Macro Controls}_{t-1} + \varepsilon_{b,t}, \tag{5}$$

- Our regressions vary the dependent variable $y_{b,t}$:
  - Total debt, including secured debt (balance sheet data)
  - Total unsecured credit (account-level data)
  - Total unsecured bank and nonbank credit (account-level data)

Results: Borrower-level credit

	(1) Debt	(2) Credit	(3) Bank Credit	(4) Nonbank Credit
A. Corporate credit				
MP Shock	-1.46***	-0.12	-0.41	7.15***
	(0.10)	(0.25)	(0.25)	(0.67)
Observations	776,559	849,021	752,889	87,370
R2	0.84	0.72	0.70	0.82
B. Consumer credit				
MP Shock	-3.11***	-5.11***	-5.52***	3.94***
	(0.02)	(0.04)	(0.04)	(0.06)
Observations	22,955,365	21,141,615	18,375,312	6,385,964
R2	0.83	0.69	0.67	0.69
Macro Controls	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes

- Nonbanks increase credit supply, thereby attenuating the fall in total debt/credit at the borrower-level due to the traditional bank-lending channel

Nonbanks and real effects of monetary policy

- What does the increase in nonbank credit after a monetary tightening imply for borrowers' real outcomes?

$$\begin{aligned}\log(y_{b,t}) = \alpha_b + \beta(\text{Nonbank borrower}_{b,t-1} \times \text{MP Shock}_{t-1}) \\ + \gamma \text{MP Shock}_{t-1} + \theta(\text{Nonbank borrower}_{b,t-1} \times \text{Macro Controls}_{t-1}) + \varepsilon_{b,t},\end{aligned} \tag{6}$$

  - $y_{b,t}$ are real outcomes such as investment (firms) and consumption (households)
  - Nonbank borrower$_{b,t-1}$ is a dummy equal to one if at least 50% of the borrowers' debt in $t-1$ was granted by nonbanks

- Hypotheses:
  - $\gamma < 0$: A monetary tightening reduces investment/consumption
  - $\beta > 0$: Borrowers with ties to nonbanks experience better real outcomes relative to those without nonbank relationships

Results: Real effects

	Corporates		Households	
	Investment	Wage bill	Consumption	MV new cars
MP Shock	-2.91***	-1.67**	-2.52***	-1.45***
	(0.18)	(0.06)	(0.01)	(0.16)
Observations	504,288	621,602	23,232,087	131,562
R2	0.69	0.90	0.59	0.60
Macro Var. Interactions	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes

- Ties to nonbanks insulate borrowers from adverse real effects of monetary tightening shocks, esp. so for corporate borrowers
- Similar results for a range of other real outcomes (e.g. NFC profits and total assets; HH disp. income and real estate) ▸ Firms ▸ Households

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Nonbank borrower x MP Shock	3.96***	1.09**	0.94***	6.22*
	(1.03)	(0.38)	(0.04)	(0.62)
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Aggregate effects: firms in industries with larger nonbank presence

	Net investment	Net investment	Net investment	Net investment
Nonbank industry share x MP Shock	0.847***	0.536***	0.130***	0.108***
	(0.0271)	(0.0287)	(0.0287)	(0.0253)
Observations	539,734	539,734	539,734	504,294
MacroControls	Yes	Yes	Yes	Yes
IndustryFE	No	Yes	Yes	No
FirmFE	No	No	No	Yes
YearFE	No	No	Yes	Yes

Firm-level clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

$$\text{log(net investment)}_{it} = \alpha_i + \alpha_j + \alpha_t + \beta \text{Nonbank industry share}_{j,t-1} \times \text{MPshock}_{t-1} + \gamma \text{Macro Interactions}_{t-1} + \epsilon_{i,t}$$

- Previous firm-level regressions showed higher investment of firms with existing ties to nonbanks after a monetary contraction
- Here we show that firms in industries with larger nonbank presence perform relatively better, regardless of whether they had nonbank ties or not

Aggregate effects: industries with larger nonbank presence

	(1) Net investment	(2) Value-added
MP Shock	-34.52*	-24.21*
	(13.81)	(10.29)
Nonbank industry share x MP Shock	58.40**	66.88**
	(33.38)	(37.89)
Observations	195	199
R2	0.94	0.97
Macro Controls	Yes	Yes
Macro Control Interactions	Yes	Yes
Industry FE	Yes	Yes

$$\log(\text{outcome})_{it} = \alpha_j + \beta \text{Nonbank industry share}_{j,t-1} \times \text{MPshock}_{t-1} + \gamma \text{Macro Interactions}_{t-1} + \epsilon_{i,t}$$

- Aggregate investment/value-added in industries with larger nonbank presence are less affected by monetary contractions
- Ex-ante unclear since average nonbank credit share is only 8%

Robustness

1. Monetary Policy and Lending Decisions
   - Alternative monetary policy shocks (Altavilla et al., 2019); alternative fixed effects and clustering
2. Nonbank risk-taking channel of monetary policy
   - Repeated with ILST fixed effects to include borrowers with a single lender-type
3. Borrower-level effects of monetary policy
   - Effects on credit supply: replace borrower fixed effects with industry/municipality effects to include one-time borrowers
   - Real effects: include borrower-level controls; alternative measure of nonbank relationships

Conclusion

- We find that an unexpected tightening of monetary policy..
  1. leads nonbanks to increase their share in credit supply
  2. does not induce nonbanks to shift their credit supply towards ex-ante riskier firms
  3. leads nonbanks to increase their credit supply to both firms and households
  4. has significantly less real consequences for borrowers with ties to nonbanks [esp. for firms]
- We provide evidence of a channel working through Danish nonbanks' reliance on long-term funding
- Results suggest that a large nonbank sector may reduce the effectiveness of traditional monetary policy to curtail credit growth

Thank you for your feedback

Summary statistics

Firms | Households

	All borrowers			Nonbank borrowers			Bank borrowers		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Panel A. Firms with bank & nonbank lenders									
Total debt (m DKK)	8.02	96.54	0.15	11.93	282.33	0.19	7.79	72.24	0.15
Interest rate	0.12	0.37	0.05	0.06	0.11	0.04	0.13	0.38	0.05
Nonbank debt share	0.06	0.20	0.00	0.85	0.17	0.94	0.01	0.06	0.00
No. of lenders	3.32	1.92	3.00	3.15	1.37	3.00	3.33	1.94	3.00
No. of nonbank lenders	0.60	0.75	0.00	1.53	0.77	1.00	0.55	0.71	0.00
Total assets (m DKK)	299.40	4,403.78	13.23	326.73	7,111.51	7.56	297.78	4,189.00	13.66
N	370,977			20,421			350,556		
Panel B. Households with bank & nonbank lenders									
Total debt (thsd DKK)	170.65	1,464.54	23.00	72.20	1,212.21	24.91	181.44	1,489.20	22.68
Interest rate	0.10	0.11	0.08	0.10	0.10	0.07	0.10	0.11	0.08
Nonbank debt share	0.12	0.25	0.00	0.79	0.20	0.80	0.04	0.11	0.00
No. of lenders	4.40	2.52	4.00	4.90	2.75	4.00	4.35	2.49	4.00
No. of nonbank lenders	1.51	1.39	1.00	2.59	1.57	2.00	1.39	1.32	1.00
Disp. income (thsd DKK)	399.71	609.32	358.03	334.03	309.31	290.17	406.91	633.21	365.45
N	20,291,278			2,004,404			18,286,874		

Table 1: Nonbank (bank) borrowers are those who receive at least 50% of their debt from nonbank (banks).

- Focusing on borrowers receiving credit from banks and nonbanks simultaneously reduces our sample by ca. 75%

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No. of lenders	3.32	1.92	3.00	3.15	1.37	3.00	3.33	1.94	3.00
No. of nonbank lenders	0.60	0.75	0.00	1.53	0.77	1.00	0.55	0.71	0.00
Total assets (m DKK)	299.40	4,403.78	13.23	326.73	7,111.51	7.56	297.78	4,189.00	13.66
N	370,977			20,421			350,556		
Panel B. Households with bank & nonbank lenders									
Total debt (thsd DKK)	170.65	1,464.54	23.00	72.20	1,212.21	24.91	181.44	1,489.20	22.68
Interest rate	0.10	0.11	0.08	0.10	0.10	0.07	0.10	0.11	0.08
Nonbank debt share	0.12	0.25	0.00	0.79	0.20	0.80	0.04	0.11	0.00
No. of lenders	4.40	2.52	4.00	4.90	2.75	4.00	4.35	2.49	4.00
No. of nonbank lenders	1.51	1.39	1.00	2.59	1.57	2.00	1.39	1.32	1.00
Disp. income (thsd DKK)	399.71	609.32	358.03	334.03	309.31	290.17	406.91	633.21	365.45
N	20,291,278			2,004,404			18,286,874		

Table 1: Nonbank (bank) borrowers are those who receive at least 50% of their debt from nonbank (banks).

- Focusing on borrowers receiving credit from banks and nonbanks simultaneously reduces our sample by ca. 75%

Summary statistics

▸ Firms ▸ Households

	All borrowers			Nonbank borrowers			Bank borrowers		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Panel A. Firms with bank & nonbank lenders									
Total debt (m DKK)	8.02	96.54	0.15	11.93	282.33	0.19	7.79	72.24	0.15
Interest rate	0.12	0.37	0.05	0.06	0.11	0.04	0.13	0.38	0.05
Nonbank debt share	0.06	0.20	0.00	0.85	0.17	0.94	0.01	0.06	0.00
No. of lenders	3.32	1.92	3.00	3.15	1.37	3.00	3.33	1.94	3.00
No. of nonbank lenders	0.60	0.75	0.00	1.53	0.77	1.00	0.55	0.71	0.00
Total assets (m DKK)	299.40	4,403.78	13.23	326.73	7,111.51	7.56	297.78	4,189.00	13.66
N	370,977			20,421			350,556		
Panel B. Households with bank & nonbank lenders									
Total debt (thsd DKK)	170.65	1,464.54	23.00	72.20	1,212.21	24.91	181.44	1,489.20	22.68
Interest rate	0.10	0.11	0.08	0.10	0.10	0.07	0.10	0.11	0.08
Nonbank debt share	0.12	0.25	0.00	0.79	0.20	0.80	0.04	0.11	0.00
No. of lenders	4.40	2.52	4.00	4.90	2.75	4.00	4.35	2.49	4.00
No. of nonbank lenders	1.51	1.39	1.00	2.59	1.57	2.00	1.39	1.32	1.00
Disp. income (thsd DKK)	399.71	609.32	358.03	334.03	309.31	290.17	406.91	633.21	365.45
N	20,291,278			2,004,404			18,286,874		

Table 1: Nonbank (bank) borrowers are those who receive at least 50% of their debt from nonbank (banks).

- Focusing on borrowers receiving credit from banks and nonbanks simultaneously reduces our sample by ca. 75%

Nonbank risk-taking channel

- Do nonbanks shift their loans towards more risky borrowers in response to a monetary tightening?
- Empirical specification:

$$y_{b,l,t} = \alpha_{b,t} + \delta_l + \beta(\text{Nonbank}_l \times \text{MP Shock}_{t-1}) + \theta(\text{Nonbank}_l \times \text{Macro Controls}_{t-1}) + \gamma(\text{Nonbank}_l \times \text{MP Shock}_{t-1} \times \text{Borrower Risk}_{b,t}) + \varepsilon_{b,l,t} \quad (7)$$

- Absent a credit score/default risk indicator, we proxy borrower risk with delinquency history and other observable characteristics
  - Firms: leverage, sales, and cash holdings
  - Households: leverage, income, and unemployment history
- Hypothesis: $\gamma > 0$, meaning that after a monetary tightening, nonbanks increase their lending to firms with above median riskiness relative to banks

No evidence of nonbank risk-taking

Firms | Households

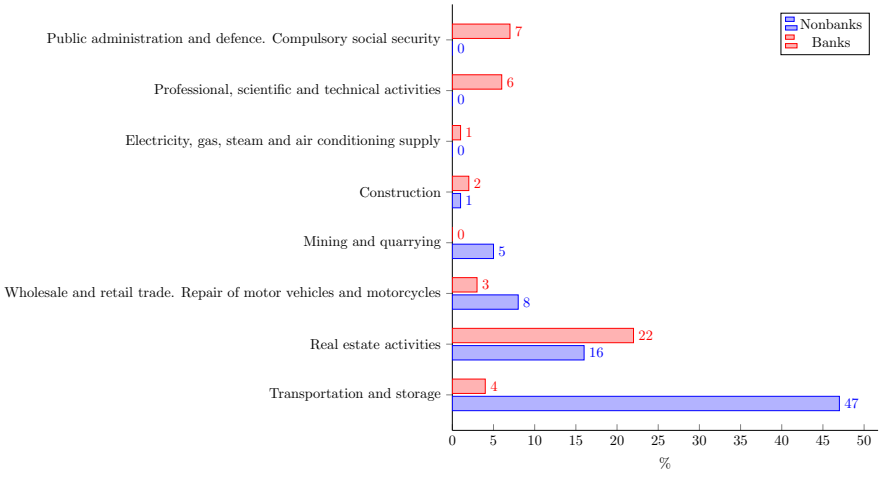
	Corporate Credit		Consumer Credit	
A. Outcome var: Log debt				
Nonbank x JK	0.51	1.24	5.85***	5.494***
	(1.72)	(1.821)	(1.03)	(0.108)
Triple - Leverage	-2.25	0.06	-1.47***	-1.32***
	(2.59)	(1.58)	(0.21)	(0.136)
Observations	230,349	596,803	14,944,449	26,671,289
R2	0.66	0.42	0.54	0.27
Borrower-Year FE	Yes		Yes	
ILST FE		Yes		Yes

No evidence of nonbank risk-taking

Firms | Households

	Corporate Credit		Consumer Credit	
A. Outcome var: Log debt				
Nonbank x JK	0.51	1.24	5.85***	5.494***
	(1.72)	(1.821)	(1.03)	(0.108)
Triple - Leverage	-2.25	0.06	-1.47***	-1.32***
	(2.59)	(1.58)	(0.21)	(0.136)
Observations	230,349	596,803	14,944,449	26,671,289
R2	0.66	0.42	0.54	0.27
Borrower-Year FE	Yes		Yes	
ILST FE		Yes		Yes

Most popular borrower industries by lender type



Firms - Summary statistics

Return

	All firms			Nonbank borrowers			Bank borrowers		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Panel A. Full dataset									
Total assets (m DKK)	134.31	2,661.45	5.44	162.32	4,401.73	4.66	133.27	2,574.31	5.47
Total debt (m DKK)	3.20	48.81	0.06	6.01	173.76	0.12	3.10	37.02	0.05
Interest rate	0.11	0.34	0.05	0.05	0.12	0.04	0.12	0.35	0.05
Nonbank debt share	0.04	0.17	0.00	0.92	0.15	1.00	0.00	0.04	0.00
FTE employees	76.37	843.78	3.00	28.11	274.03	3.00	78.12	857.35	3.00
Firm age (Years)	14.87	15.22	10.00	15.81	18.84	10.00	14.83	15.08	10.00
No. of lenders	2.23	1.62	2.00	2.38	1.32	2.00	2.22	1.63	2.00
No. of nonbank lenders	0.26	0.56	0.00	1.29	0.62	1.00	0.22	0.52	0.00
Debt to equity ratio	5.29	70.13	2.01	5.99	192.06	1.99	5.26	60.90	2.01
N	1,888,881			66,308			1,822,573		
Panel B. Firms with bank & nonbank lenders									
Total assets (m DKK)	299.40	4,403.78	13.23	326.73	7,111.51	7.56	297.78	4,189.00	13.66
Total debt (m DKK)	8.02	96.54	0.15	11.93	282.33	0.19	7.79	72.24	0.15
Interest rate	0.12	0.37	0.05	0.06	0.11	0.04	0.13	0.38	0.05
Nonbank debt share	0.06	0.20	0.00	0.85	0.17	0.94	0.01	0.06	0.00
FTE employees	146.60	1,160.96	8.00	48.25	356.40	6.00	152.33	1,190.94	8.45
Firm age (Years)	18.64	15.76	15.00	16.04	15.49	12.00	18.79	15.76	15.00
No. of lenders	3.32	1.92	3.00	3.15	1.37	3.00	3.33	1.94	3.00
No. of nonbank lenders	0.60	0.75	0.00	1.53	0.77	1.00	0.55	0.71	0.00
Debt to equity ratio	5.75	44.22	2.12	5.81	33.10	2.14	5.74	44.78	2.12
N	370,977			20,421			350,556		

Table 2: Nonbank (bank) borrowers are those who receive at least 50% of their debt from nonbank (banks).

Households - Summary statistics

Return

	All households			Nonbank borrowers			Bank borrowers		
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median
Panel A. Full dataset									
Total debt (thsd DKK)	132.11	1,062.04	6.90	62.81	1,066.30	16.44	137.38	1,061.53	6.02
Nonbank debt share	0.08	0.23	0.00	0.85	0.21	0.93	0.02	0.08	0.00
Interest rate	0.09	0.11	0.06	0.09	0.10	0.06	0.09	0.11	0.06
No. of lenders	3.29	2.41	3.00	4.07	2.75	3.00	3.23	2.37	3.00
No. of nonbank lenders	0.93	1.30	0.00	2.22	1.57	2.00	0.83	1.22	0.00
Disp. income (thsd DKK)	365.93	615.17	318.10	316.68	301.79	268.83	369.67	632.51	322.34
Age of oldest adult	47.78	14.85	47.00	49.01	14.38	49.00	47.69	14.88	47.00
Recently unemployed	0.09	0.28	0.00	0.09	0.29	0.00	0.09	0.28	0.00
N	72,815,493			5,142,829			67,672,664		
Panel B. Households with bank & nonbank lenders									
Total debt (thsd DKK)	170.65	1,464.54	23.00	72.20	1,212.21	24.91	181.44	1,489.20	22.68
Nonbank debt share	0.12	0.25	0.00	0.79	0.20	0.80	0.04	0.11	0.00
Interest rate	0.10	0.11	0.08	0.10	0.10	0.07	0.10	0.11	0.08
No. of lenders	4.40	2.52	4.00	4.90	2.75	4.00	4.35	2.49	4.00
No. of nonbank lenders	1.51	1.39	1.00	2.59	1.57	2.00	1.39	1.32	1.00
Disp. income (thsd DKK)	399.71	609.32	358.03	334.03	309.31	290.17	406.91	633.21	365.45
Age of oldest adult	48.65	12.51	49.00	50.45	12.63	51.00	48.45	12.48	48.00
Recently unemployed	0.10	0.30	0.00	0.11	0.31	0.00	0.10	0.30	0.00
N	20,291,278			2,004,404			18,286,874		

Table 3: Nonbank (bank) borrowers are those who receive at least 50% of their debt from nonbank (banks).

Robustness: alternative MP shocks & firm credit

	(1) JK (Sign)	(2) JK (HF Eureon)	(3) AL 1M	(4) AL 3M	(5) AL 1Y
A. Outcome var: Log debt					
Nonbank x MP Shock	4.09***	4.51***	0.55	5.95***	0.64
	(1.51)	(1.55)	(1.35)	(1.46)	(1.71)
Observations	275,516	275,516	288,798	288,798	288,798
R2	0.65	0.65	0.65	0.65	0.65
B. Outcome var: Interest rate					
Nonbank x MP Shock	-0.004**	-0.004**	-0.001	-0.005***	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	380,162	380,162	399,907	399,907	399,907
R2	0.46	0.46	0.47	0.47	0.47
Macro Control Interactions	Yes	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes

Robustness: alternative MP shocks & consumer credit

	(1) JK (Sign)	(2) JK (HF Eureon)	(3) AL 1M	(4) AL 3M	(5) AL 1Y
A. Outcome var: Log debt					
Nonbank x MP Shock	5.77***	4.12***	1.73***	5.84***	3.75***
	(0.12)	(0.13)	(0.13)	(0.11)	(0.14)
Observations	16,171,885	16,171,885	17,589,906	17,589,906	17,589,906
R2	0.54	0.54	0.54	0.54	0.54
B. Outcome var: Interest rate					
Nonbank x MP Shock	0.003***	-0.000***	0.002***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	20285707	20285707	22092009	22092009	22092009
R2	0.50	0.50	0.52	0.52	0.52
Macro Control Interactions	Yes	Yes	Yes	Yes	Yes
Borrower-Year FE					
Lender FE	Yes	Yes	Yes	Yes	Yes
LenderFE	Yes	Yes	Yes	Yes	Yes

Robustness: alternative clustering & firm credit

	(1)	(2)	(3)	(4)	(5)
A. Outcome var: Log debt					
Nonbank x MP Shock	4.09***	4.09***	4.09	4.09	4.09***
	(1.51)	(1.41)	(3.43)	(4.94)	(1.61)
Observations	275,516	275,516	275,516	275,516	275,516
R2	0.65	0.65	0.65	0.65	0.65
B. Outcome var: Interest rate					
Nonbank x MP Shock	-0.004**	-0.004***	-0.004***	-0.004	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	380,162	380,162	380,162	380,162	380,162
R2	0.46	0.46	0.46	0.46	0.46
Macro Var. Interactions	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes	Yes	Yes	Yes	Yes
Clust.: Lender-Borrower	Yes				
Clust.: Lender			Yes	Yes	
Clust.: Borrower		Yes	Yes	Yes	
Clust.: Year				Yes	
Clust.: Lender-Borrower-Year					Yes

Robustness: alternative clustering & consumer credit

	(1)	(2)	(3)	(4)	(5)
A. Outcome var: Log debt					
Nonbank x MP Shock	5.77***	5.77***	5.77***	5.77***	5.77***
	(0.12)	(0.12)	(1.77)	(1.59)	(0.13)
Observations	16,171,885	16,171,885	16,171,885	16,171,885	16,171,885
R2	0.54	0.54	0.54	0.54	0.54
B. Outcome var: Interest rate					
Nonbank x MP Shock	0.003***	0.003***	0.003***	0.003	0.003***
	(0.000)	(0.000)	(0.001)	(0.004)	(0.000)
Observations	20,285,707	20,285,707	20,285,707	20,285,707	20,285,707
R2	0.50	0.50	0.50	0.50	0.50
Macro Var. Interactions	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes	Yes	Yes	Yes	Yes
Clust.: Lender-Borrower	Yes				
Clust.: Lender			Yes	Yes	
Clust.: Borrower		Yes	Yes	Yes	
Clust.: Year				Yes	
Clust.: Lender-Borrower-Year					Yes

Results: Risk-taking in corporate credit

Return

	(1) lndebt b/se	(2) intrate b/se	(3) lndebt b/se	(4) intrate b/se	(5) lndebt b/se	(6) intrate b/se
Nonbank x JK	0.683	-0.002	1.172	-0.001	5.421***	-0.006***
	(1.787)	(0.002)	(1.714)	(0.002)	(1.874)	(0.002)
Triple - Leverage	-2.423	-0.001				
	(2.683)	(0.003)				
Triple - Sales			-3.006	-0.007**		
			(2.622)	(0.003)		
CashRat_inter					-3.275	0.004
					(3.460)	(0.004)

Results: Risk-taking in consumer credit

Return

	(1) ln debt	(2) int. rate	(3) ln debt	(4) int. rate	(5) ln debt	(6) int. rate
Nonbank x JK	5.85***	0.000	3.60***	0.004***	6.17***	0.003***
	(0.17)	(0.000)	(0.14)	(0.000)	(0.13)	(0.000)
Triple - Leverage	-1.47***	0.000				
	(0.21)	(0.000)				
Triple - Income			2.92***	-0.003***		
			(0.23)	(0.000)		
Triple - Unemployment					-0.27	-0.002***
					(0.41)	(0.000)
Observations	14,944,449	18,689,780	16,170,775	20,284,312	16,171,885	20,285,707
R2	0.54	0.51	0.54	0.51	0.54	0.50
Macro Var. Interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lower-lvl interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

- We find no evidence that nonbanks shift their credit supply towards more risky borrowers in response to a monetary tightening

Robustness: risk-taking with single-lender firms

Here, we replace our borrower-year fixed effects with ILST fixed effects to include borrowers, who do not receive credit from banks and nonbanks simultaneously

	(1) lndebt b/se	(2) intrate b/se	(3) lndebt b/se	(4) intrate b/se	(5) lndebt b/se	(6) intrate b/se
Nonbank x JK	1.453	-0.002	1.566	-0.002	5.949***	-0.007***
	(1.821)	(0.002)	(1.769)	(0.002)	(1.858)	(0.002)
Triple - Leverage	-2.624	-0.003				
	(2.640)	(0.003)				
Triple - Sales			-2.367	-0.007**		
			(2.565)	(0.003)		
CashRat_inter					-2.045	0.005
					(3.650)	(0.004)
Observations	226,453	304,458	274,624	370,977	204,663	273,483
R2	0.66	0.47	0.65	0.46	0.67	0.46
Macro Var. Interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lower-lvl interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes
ILST FE	Yes	Yes	Yes	Yes	Yes	Yes

Robustness: risk-taking with single-lender households

Here, we replace our borrower-year fixed effects with ILST fixed effects to include borrowers, who do not receive credit from banks and nonbanks simultaneously

	(1) ln debt	(2) int. rate	(3) ln debt	(4) int. rate	(5) ln debt	(6) int. rate
Nonbank x JK	5.494***	-0.000***	5.003***	0.003***	6.397***	0.002***
	(0.108)	(0.000)	(0.091)	(0.000)	(0.084)	(0.000)
Triple - Leverage	-1.328***	0.000				
	(0.136)	(0.000)				
Triple - Income			0.513***	-0.002***		
			(0.147)	(0.000)		
Triple - Unemployment					-0.511*	-0.001***
					(0.242)	(0.000)
Observations	26,671,289	30,924,207	28,729,896	33,411,968	28,730,149	33,412,275
R2	0.27	0.13	0.26	0.12	0.26	0.12
Macro Var. Interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lower-lvl interactions	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes
ILST FE	Yes	Yes	Yes	Yes	Yes	Yes

Robustness: credit supply with one-time borrowers

Here, we replace borrower fixed effects with industry fixed effects to include borrowers, who do not appear in two consecutive periods in our sample

	(1) Debt	(2) Credit	(3) Bank Credit	(4) Nonbank Credit	(5) Bank Credit Pure	(6) Nonbank Credit Pure
MP Shock	-1.98***	-4.42***	-3.88***	-6.59***	-5.56***	-13.01***
	(0.14)	(0.28)	(0.29)	(0.74)	(0.31)	(1.43)
Observations	808,852	885,929	790,078	94,920	723,918	24,421
R2	0.21	0.11	0.11	0.15	0.11	0.28
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Results: Firm-level real effects

Return

	(1) Tot. Assets	(2) Investment	(3) Oper. Profit	(4) Wage Bill
MP Shock	-2.78***	-2.91***	-5.65***	-1.67***
	(0.08)	(0.18)	(0.13)	(0.06)
Nonbank borrower x MP Shock	2.24***	3.96***	4.38***	1.09**
	(0.49)	(1.03)	(0.78)	(0.38)
Observations	776,689	504,288	607,803	621,602
R2	0.86	0.69	0.74	0.90
Macro Control Interactions	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes

Results: Household-level real effects

Return

	(1) Disp. Income	(2) Consumption	(3) MV RE	(4) MV New Cars	(5) MV Total Assets
MP Shock	-2.05***	-2.52***	-6.02***	-1.45***	-6.81***
	(0.01)	(0.01)	(0.01)	(0.16)	(0.02)
Nonbank borrower x MP Shock	0.23***	0.94***	-0.08**	6.22***	1.21***
	(0.02)	(0.04)	(0.04)	(0.62)	(0.09)
Observations	24,302,612	23,232,087	14,850,076	131,562	24,096,429
R2	0.84	0.59	0.90	0.60	0.89
Macro Control Interactions	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes

Robustness: real effects with alternative nonbank-history measure

Here, we replace our nonbank-borrower indicator (equal to one if 50% of credit came from nonbanks) with a dummy equal to one if the firm received any nonbank credit in the previous period

	(1) Tot. Assets	(2) Investment	(3) Oper. Profit	(4) Wage Bill
MP Shock	-3.16***	0.03	-5.54***	-2.06***
	(0.08)	(0.19)	(0.13)	(0.06)
Nonbank relation x MP Shock	2.25***	8.72***	5.76***	1.37***
	(0.39)	(0.86)	(0.62)	(0.31)
Observations	776,689	504,294	607,849	621,635
R2	0.86	0.68	0.74	0.90
Macro Control Interactions	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes