Cross-Border Bank Flows, Regional Household Credit Booms and Bank Risk-Taking

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Motivation

Foreign capital inflows have been shown to increase bank lending, with credit shifting towards riskier firms (Magud et al., 2014; Baskaya et al., 2017; Te Kaat, 2021)

- Drivers are typically changing national or international financial conditions
- Capital inflows affect bank lending through securities markets, interbank markets and intra-concern flows in global banks (Cetorelli and Goldberg, 2012; Temesvary et al., 2018; Correa et al., 2021).
- Evidence from Brazil (sector-level) shows that credit to households rises following capital inflows (Garber et al., 2019)

Current understanding of cross-border flows

- Wholesale funding sources are important in developing/emerging economies
- Evidence stems from aggregate, bank-level, or bank-firm data
- Little known about role of foreign capital flows for **advanced economies** or **households**

Related literature

- **Global banks as transmitters of financial and monetary shocks**
  - Cetorelli and Goldberg (2012), Baskaya et al. (2017), Temesvary et al. (2018), and Correa et al. (2021)
- **Credit predicts or causes financial fragility**
  - Müller and Verner (2024): HH credit booms can lead to boom-bust cycles
  - Caballero (2016): capital inflow bonanzas increase prob(banking crisis)
- **Credit register data** identifying impact of macroecon. shocks on banks' credit allocation
  - Expansionary MP raises banks' credit supply to the household sector, especially when banks are poorly capitalized (Altavilla et al. (2020))
  - Effects of a capital account liberalization in Hungary (Gyöngyösi et al. (2024))
- **Macro studies of households' access to credit**
  - Emerging economy banks have a highly procyclical access to non-core funding (NCF) from global capital markets (Giovanni et al., 2021)
  - When more dependent on NCF, banks raise loan supply in response to foreign NCF inflows (Baskaya et al., 2017)

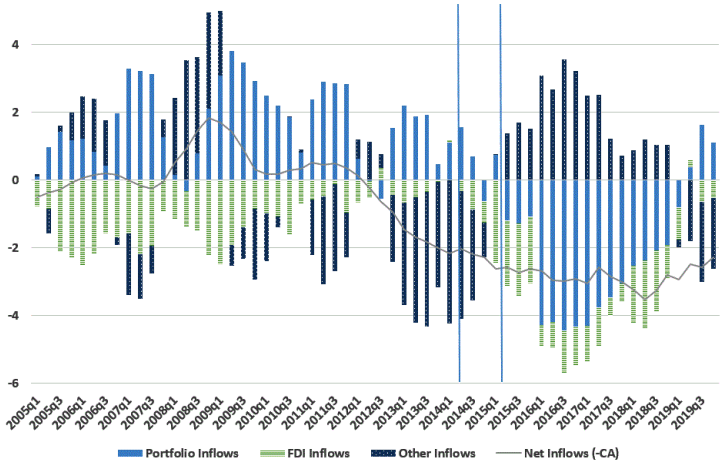
Research question

To what extent do foreign capital inflows affect the **household leverage** composition and allocation of credit **between** households in **advanced economies**?

Investigate the effects of a rise in foreign capital inflows on the household sector in Germany.

- Focus on period when ECB implemented its negative interest rate policy (NIRP) and QE programs in 2014-2015
- Net cross-border bank flows into euro area increased from -3.5% of GDP in 2014:q1 to +3% in 2016:Q3
- Provided new funds to euro area banks
- In Germany, the increase was even larger

Euro area financial account



As ECB implemented NIRP in 2014:Q2 and QE in 2015:Q1, portfolio inflows turned negative, while other investment inflows (interbank inflows) rose

Sudden rise in bank inflows in core euro area 2014/5

Figure 2 Bank Flows in the Euro Area

When foreign investors sold government bonds to accommodate ECB QE (Bergant et al., 2020), the revenues from those euro asset sales provided new funds to euro area banks

Ingredients to answer research question

To investigate how cross-border bank inflows influence bank lending and households, we use three ingredients

- **Shock: Exogenous increase in foreign bank funding** that differentially affected banks with varying dependence on non-core funding
- **Sample: German** households who had relationships with more or less **exposed banks**
- **Data:**
  → **Individual** level **survey** panel data for (a) Germany and (b) part of euro area
  → **Supervisory** bank data about granular components of balance sheet (funding)

Measuring banks' and households' exposure

- **Non-core funding** ratio: interbank borrowing, money market funding and debt securities financing as a share of total funding of a bank
- Link individual to their banks by exploiting that they report bank type in survey
- Savings and cooperative banks in Germany have legally restricted activity regions

Empirical strategy

- Regressions take the following form, following Baskaya et al. (2017):

$$\Delta Y_{h,b,t} = \alpha_t + \alpha_h + \gamma \cdot (\text{Post}_t \times \text{Non-core}_{b,2014}) + \sigma \cdot (\text{Post}_t \times \text{X}_{h,2014}) + \nu \cdot (\text{Non-core}_{b,2014} \times \text{X}_{h,2014}) + \omega \cdot (\text{Post}_t \times \text{Non-core}_{b,2014}) \times \text{X}_{h,2014} + \epsilon_{h,b,t}. \quad (1)$$

- Include household and time FE, standard errors are heteroskedasticity-robust
- Saturate with bankgroup x location x income x time FE as in Degryse et al. (2019)

The effect of foreign bank funding on credit supply

Table 1: The Effect of Cross-Border Bank Flows on Credit Allocation: Benchmark Results

	(1) ΔMortgages	(2) ΔConsLoans	(3) ΔMortgages	(4) ΔConsLoans	(5) ΔMortgages	(6) ΔConsLoans	(7) ΔMortgages	(8) ΔConsLoans
Post × Non-Core			-34.64	138.4***	-23.40	208.4***		
			(68.83)	(48.59)	(89.88)	(61.81)		
Post × Income	-19.95	-40.75**	-85.02	93.00	-98.48	153.2*	-90.63	1,565*
	(21.81)	(19.74)	(97.65)	(62.62)	(123.1)	(83.48)	(1,130)	(931.8)
Post × Income × Non-Core			3.735	-12.60***	2.520	-18.78***	-4.634	-138.4*
			(6.467)	(4.514)	(8.271)	(5.875)	(83.68)	(71.24)
Other Household Controls Interacted	No	No	No	No	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Bankgroup-location-income-time FE	No	No	No	No	No	No	Yes	Yes
Obs	3,056	3,056	1,536	1,536	1,536	1,536	528	528
R^2	0.366	0.290	0.372	0.286	0.385	0.297	0.711	0.690

Foreign bank inflows cause consumer credit to treated low-inc HH to grow at 83 pp higher rate

Robustness and additional evidence

1. Employ alternative gross and net exposure measures
2. Alternative credit measure
3. Rural vs. urban regions, role of bank presence
4. Drop specific households (young, unemployed, self-employed etc.)
5. Allow for interaction of treatment with bank controls
6. Placebo test using pre-inflow period, other HH outcomes and placebo-treatment of banks
7. External validity using euro area data

Robustness

Table 2: Alternative Bank Exposure Measures, Rural vs Urban Regions, the Role of Bank Presence and Alternative Definition of Credit

	(1) Gross Expos	(2) Net Expos	(3) Urban	(4) Rural	(5) Sav. Banks	(6) Single Bank	(7) Low Pres	(8) High Pres	(9) IHS Credit
Post × Income	105.2	-46.65	101.7	98.68	9.54	-10.20	-19.02	132.4	168.1*
	(79.99)	(39.74)	(130.8)	(108.0)	(81.64)	(94.85)	(102.9)	(83.94)	(90.47)
Post × Bank Exp.	197.4***	107.0**	190.8	132.5*	104.2*	124.7	-20.08	179.9***	227.0***
	(64.02)	(46.22)	(118.2)	(78.45)	(60.16)	(80.32)	(85.21)	(64.74)	(67.08)
Post × Income × Bank Exp.	-16.23***	-9.731**	-15.08	-14.82**	-9.41*	-11.23	2.63	-16.85***	-20.49***
	(6.071)	(4.549)	(10.32)	(7.276)	(5.62)	(7.62)	(8.16)	(6.02)	(6.361)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1,536	1,536	458	1,062	856	550	600	828	1,536
R^2	0.454	0.545	0.333	0.295	0.285	0.272	0.251	0.303	0.295

Results robust for various exposure and credit measures; stronger results in rural areas and those with higher bank presence

Additional Results

Table 3: Additional Results: Exclusions and Heterogeneity Tests

	(1) No switchers	(2) No UI	(3) No self-employed	(4) Age $\geq$ 30	(5) Age $\geq$ 40	(6) No student loans	(7) Formal credit	(8) Triple bank interactions
Post $\times$ Income	102.1	61.39	188.8*	160.0*	88.31	97.10	99.37	921.4
	(88.29)	(100.4)	(101.3)	(84.31)	(86.97)	(85.11)	(85.25)	(594.3)
Post $\times$ Non-Core	172.1***	157.5**	202.9***	178.7***	150.1**	150.2**	152.4**	203.7***
	(64.04)	(71.87)	(68.99)	(61.97)	(68.23)	(64.52)	(64.65)	(70.01)
Post $\times$ Income $\times$ Non-Core	-11.56*	-15.25**	-20.06***	-18.65***	-14.56**	-15.15**	-15.27**	-17.73**
	(6.278)	(7.244)	(6.673)	(5.884)	(6.069)	(5.921)	(5.926)	(6.986)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Bank Interactions	No	No	No	No	No	No	No	Yes
Obs	1,302	1,264	1,090	1,488	1,380	1,536	1,534	1,534
R^2	0.311	0.306	0.308	0.295	0.308	0.313	0.313	0.328

Dropping certain types of households leaves main results unchanged

Placebo Tests

Table 4: Placebo Tests

	(1) Benchmark Ln(ConsLoans)	(2) Placebo Ln(ConsLoans)	(3) Δ Ln(ConsLoans)	(4) Δ Ln(Income)	(5) Δ Ln(NetWorth)	(6) Δ Stocks	(7) Δ Housing	(8) Δ Tenure
Post × Income	0.0301	-0.0729	37.17	19.60**	-21.92	-0.306	3.206	-0.0959***
	(0.386)	(0.500)	(26.28)	(8.014)	(15.62)	(0.37)	(3.1)	(0.0366)
Post × Tangible			-162.3					
			(586.6)					
Post × Income × Tangible			32.72					
			(47.54)					
Post × Non-Core	0.427	0.180		-1.698	-6.521	0.49	-0.0647	-0.0004
	(0.283)	(0.307)		(12.84)	(17.18)	(0.85)	(4.993)	(0.0482)
Post × Income × Non-Core	-0.0453*	0.0163		0.5	2.443	-0.0769	0.161	-0.0026
	(0.0275)	(0.0322)		(1.191)	(1.534)	(0.0731)	(0.471)	(0.0044)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Bank Interactions	No	No						
Obs	2,910	1,958	1,536	1,494	1,468	1,536	1,536	1,536
R^2	0.702	0.694	0.29	0.541	0.462	0.383	0.39	0.5

Results disappear for pre-inflow sample and placebo treatment or outcome variables

External validity: euro area households

Table 5: Results for the European Household Sample

	(1) Ln(ConsLoans)	(2) Ln(ConsLoans)	(3) Ln(ConsLoans)	(4) Ln(ConsLoans)	(5) Ln(ConsLoans)	(6) Ln(Mortgages)
Post × Income	-0.197**	-0.134**	-0.122**	-0.089*	-0.170*	-0.059
	(0.08)	(0.05)	(0.04)	(0.04)	(0.08)	(0.01)
Post × Income × Flows	-0.034*	-0.027*	-0.035**	-0.025***	-0.026	-0.019
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	No	No	Yes	No	No	No
Household Controls × Post × Flows	Yes	Yes	Yes	No	Yes	Yes
Obs	34,980	28,270	34,980	35,034	29,434	34,980
No. of Countries	7	6	7	7	6	7
R^2	0.726	0.735	0.727	0.725	0.727	0.873

Results hold in broader euro area sample

What are the underlying mechanisms?

- We show that more exposed banks indeed see higher wholesale funding inflows after shock
- Funding seems to come directly from non-euro area banks to regional German banks, tickle down effect via international German banks further reinforces funding increase
- Lending increase driven by banks with lower capitalization, consistent with risk-taking channel of MP transmission
- Credit mainly grows along extensive margin

What are the underlying mechanisms?

Table 6: Do Non-Core Volumes Increase for More Exposed Banks?

	All Banks		Regional Banks	
	(1)	(2)	(3)	(4)
	Ln(Noncore)	Ln(Interbank)	Ln(Noncore)	Ln(Interbank)
Post × Non-Core	0.003***	0.003***	0.006***	0.005**
	(0.001)	(0.001)	(0.002)	(0.002)
Bank FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Obs	14,212	14,212	11,735	11,735
R^2	0.96	0.95	0.98	0.97

More exposed banks see higher wholesale funding inflows after aggregate bank flow shock

What are the underlying mechanisms?

Table 7: Mechanisms: Funding Sources, Extensive Margin and Bank Capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
						Low-Cap	High-Cap
	ΔLn(ConsLoans)	ΔLn(ConsLoans)	ΔLn(ConsLoans)	Prob(NewLoan)	Prob(MoreCred)	ΔLn(ConsLoans)	ΔLn(ConsLoans)
Post × Income	-96.06**	-94.01**	-117.8***	3.01	-1.73	293.3***	-39.55
	(40.56)	(41.26)	(41.96)	(5.27)	(5.13)	(72.58)	(155.7)
Post × Exp.				6.31*	0.718	235.3***	143.4
				(3.82)	(3.55)	(72.58)	(117.2)
Post × Income × DE Exp.	-90.06***						
	(34.78)						
Post × Income × EA exp.		-67.8					
		(62.75)					
Post × Income × Non-EA exp.			-521.4**				
			(236.9)				
Post × Income × Exp.				-0.607*	0.00	-26.29***	-6.630
				(0.362)	(0.364)	(6.907)	(11.55)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	1,536	1,536	1,536	1,502	1,502	784	752
R^2	0.296	0.289	0.291	0.454	0.545	0.333	0.295

Results mainly driven by higher inflows originating from direct lending of non-euro area banks; extensive margin matters more than intensive margin; poorly capitalized banks drive results

Does the growth of credit supply have real effects?

- Exploit data on consumption in (small number of) of durables and non-durables (food and beverages)

Does credit growth induce higher consumption?

Table 8: Bank Flows, Credit and Consumption Effects

	(1) Non-durable	(2) Durable	(3) Food	(4) Restaurant
Post × Income	-0.0411	-0.0151	-0.0158	-0.134
	(0.0251)	(0.0677)	(0.0203)	(0.0839)
Household FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Obs	2,910	2,674	2,910	2,910
R^2	0.741	0.654	0.813	0.772

Only non-durable consumption rises, concentrated in food and beverages outside home

Consumption growth and bank exposure

Table 9: Bank Flows and Consumption: Distinguishing by Bank Exposure

	Less Exposed Banks				More Exposed Banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Non-durable	Durable	Food	Restaurant	Non-durable	Durable	Food	Restaurant
Post × Income	-0.0225	-0.0320	0.00984	-0.0500	-0.0553*	-0.00768	-0.0316	-0.177*
	(0.0383)	(0.119)	(0.0330)	(0.158)	(0.0322)	(0.0815)	(0.0254)	(0.0992)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	950	874	950	950	1,960	1,800	1,960	1,960
R^2	0.751	0.680	0.838	0.781	0.738	0.648	0.803	0.769

Only customers of exposed banks increase consumption

Conclusions

- **Foreign bank inflows** affect household credit in **advanced economies**
- **Low-income households** experience a 51 pp higher growth rate of **consumer credit**
- Effects stem mainly from **banks dependent on non-core funding**: Low-income HH with more exposed main bank have 83 pp. faster growth of consumer credit
- Effects occur mainly on the extensive margin
- Effect is predominantly coming from **weakly capitalized** banks
- We interpret this as **increased risk-taking** by banks
- No evidence of increased mortgage lending
- The rise in credit supply induces an **increase in consumption**, exclusively in non-durables
- External validity in euro area data

Thank You!

Summary Stats German households

Table 10: Summary Statistics for German Households

Variable	Observations	Mean	SD	5th	95th
ΔMortgages	1,536	-15.08	415.86	-1012.67	999.88
ΔConsumerloans	1,536	-31.12	396.71	-851.74	829.43
Consumption(non-durable)	1,536	9.26	0.73	8.19	10.31
Consumption(durable)	1,468	9.79	1.19	8.19	11.09
Consumption(food)	1,536	8.53	0.56	7.62	9.39
Consumption(restaurant)	1,536	6.46	2.12	0.00	8.34
Ln(Noncore)	14,615	11.26	2.10	8.01	14.61
Ln(Interbank)	14,615	11.18	2.04	8.00	14.51
ROA	13,524	0.04	2.48	0.00	0.42
ROE	13,524	1.89	16.99	0.00	6.64
Net wealth	1,536	12.05	1.87	8.22	14.31
Income	1,536	10.85	0.75	9.61	11.95
Renter	1,536	0.31	0.46	0.00	1.00
Age	1,536	59.71	14.30	32.00	80.00
Foreign	1,536	0.06	0.24	0.00	1.00
Income Exp.	1,536	0.08	0.27	0.00	1.00
Unemployed	1,536	0.29	0.45	0.00	1.00
Self-Employed	1,536	0.18	0.38	0.00	1.00
Non-Core	1,536	13.47	5.84	5.13	23.77
Gross Interbank	1,536	12.54	5.65	4.54	21.65
Gross Domestic Interbank	1,536	0.02	0.98	-1.41	1.63
Gross EA Interbank	1,536	0.02	1.02	-0.38	1.98
Gross Non-EA Interbank	1,536	-0.02	0.36	-0.08	0.10
Net Interbank	1,536	4.93	7.72	-8.42	16.86
Size	1,536	14.46	1.17	12.64	16.22
ROA	1,534	0.15	0.08	0.02	0.28
Equity	1,536	5.67	1.02	4.02	7.55
Liquidity	1,536	1.40	0.43	0.85	2.32

Summary Stats euro area households

Table 11: Summary Statistics for European Households

Variable	Observations	Mean	SD	5th	95th
Ln(ConsLoans)	34,980	2.3	4.0	0.0	10.1
Ln(Mortgages)	34,980	3.3	5.1	0.0	12.2
Net wealth	34,980	12.1	1.9	8.3	14.6
Income	34,980	10.6	0.9	9.2	12.0
Renter	34,980	0.2	0.4	0	1
Age	34,980	57.1	15.3	31	81
Foreign	28,270	0.1	0.3	0	1
Bank flows	34,980	0.6	2.9	-1.4	7.0

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