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 (at least in emerging markets), 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 (CetorelliGoldberg, 2012; Temesvary et al., 2018 Correia 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 Goldberg (2012), Baskaya et al. (2017), Temesvary et al. (2018), Correia et al. (2021).
- Credit predicts or causes financial fragility
 - Muller Verner (2023): 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 (Gyongyosi (2019))
- Macro studies of households' access to credit
 - Emerging economy banks have a highly procyclical access to non-core funding (NCF) from global capital markets (DiGiovanni et al.(2022)
 - When more dependent on NCF, banks raise loan supply in response to foreign NCF inflows (Baskaya et al. (2017))



Do foreign bank inflows affect **regional** credit supply, the allocation of credit **between** households or the composition of credit 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; in Germany, the change was even larger
- Provided new funds to German and other euro area banks
- Banks that relied heavily on non-core funding were more affected

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 (?), the revenues from those euro asset sales provided new funds to euro area banks



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:
 - \rightarrow Individual level survey panel data for (a) Germany and (b) part of euro area
 - \rightarrow **Supervisory** bank data about granular components of balance sheet (funding)



- 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



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

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



Table 3 The Effect of Cross-Border Bank Flows on Credit Allocation—Benchmark Results

	(1) ∆Mortgages	(2) ∆ConsLoans	(3) ∆Mortgages	(4) ∆ConsLoans	(5) ∆Mortgages	(6) ∆ConsLoans	(7) ∆Mortgages	(8) ∆ConsLoans
$\textbf{Post} \times \textbf{Noncore}$			-34.64	138.4***	-23.40	208.4***	-131.62	287.63***
Post × Income	-19.95	-40.75**	-85.02	93.00	-98.48	153.2*	-464.38	125.84
$\textbf{Post} \times \textbf{Income} \times \textbf{Noncore}$	(21101)	()	3.735 (6.467)	-12.60*** (4.514)	2.520 (8.271)	-18.78*** (5.875)	11.62 (12.81)	-22.75** (9.27)
Other Household Controls Interacted Household FE Time FE Bankgroup-location-income-time FE	No Yes Yes No	No Yes Yes No	Yes Yes No	ivo Yes Yes No	Yes Yes No	Yes Yes No	Yes No Yes	Yes No Yes
Obs R^2	3,056 0.366	3,056 0.290	1,536 0.372	1,536 0.286	1,536 0.385	1,536 0.297	1,422 0.519	1,422 0.437

Foreign bank inflows cause consumer credit to low-income households who are customers of exposed banks to grow at 83 pp higher rate



- 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) Cross Expos	(2) Not Expos	(3) Urban	(4) Pural	(5) Sav Banks	(6) Single Bank	(7)	(8) High Pros	(9)
	Gloss Expos	Net Expos	Orban	Kurai	Sav. Daliks	Single Dalik	LOW Fies	Flight Fres	Ins credit
$Post\timesIncome$	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 $ imes$ 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 \times Income \times 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



Table 3: Additional Results: Exclusions and Heterogeneity Tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No switchers	No UI	No self-employed	Age \geq 30	$Age \ge 40$	No student loans	Formal credit	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



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Benchmark Ln(ConsLoans)	Placebo Ln(ConsLoans)	Δ Ln(ConsLoans)	Δ Ln(Income)	Δ Ln(NetWorth)	Δ Stocks	Δ Housing	Δ Tenure
Post \times 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 \times Tangible			-162.3					
			(586.6)					
Post \times Income \times Tangible			32.72					
			(47.54)					
Post \times 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)
$Post\timesIncome\timesNon-Core$	-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

Table 4: Placebo Tests

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



	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(ConsLoans)	Ln(ConsLoans)	Ln(ConsLoans)	Ln(ConsLoans)	Ln(ConsLoans)	Ln(Mortgages)
Post imes 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)
$Post\timesIncome\timesFlows$	-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 \times Post \times 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
<i>R</i> ²	0.726	0.735	0.727	0.725	0.727	0.873

Table 5: Results for the European Household Sample

Results hold in broader euro area sample



- 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



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

	All	Banks	Region	al Banks
	(1)	(2)	(3)	(4)
	Ln(Noncore)	Ln(Interbank)	Ln(Noncore)	Ln(Interbank)
$Post\timesNon\text{-}Core$	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?



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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
						Low-Cap	High-Cap
	$\Delta Ln(ConsLoans)$	$\Delta Ln(ConsLoans)$	$\Delta Ln(ConsLoans)$	Prob(NewLoan)	Prob(MoreCred)	$\Delta Ln(ConsLoans)$	$\Delta Ln(ConsLoans)$
$Post \times Income$	-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 \times Exp.				6.31*	0.718	235.3***	143.4
				(3.82)	(3.55)	(72.58)	(117.2)
Post \times Income \times DE Exp.	-90.06***						
	(34.78)						
Post \times income \times EA exp.		-67.8					
		(62 75)					
$Post \times Income \times Non-EA exp.$			-521.4**				
			(236.9)				
Post \times Income \times 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



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



	(1)	(2)	(3)	(4)
	Non-durable	Durable	Food	Restaurant
$Post\timesIncome$	-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

 Table 8: Bank Flows, Credit and Consumption Effects

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



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

	Less Exposed Banks						sed Banks	1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Non-durable	Durable	Food	Restaurant	Non-durable	Durable	Food	Restaurant
$Post\timesIncome$	-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

- NORGES BANK
- Foreign bank inflows affect regional bank lending to households in advanced economies
 - Low-income households experience a 51 pp higher growth rate of consumer credit
 - No evidence of increased mortgage lending
 - External validity in euro area data
- 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
 - Mainly on the extensive margin of lending
 - Predominantly by weakly capitalized banks
- Foreign bank inflows follow a risk-taking channel, similar to that of monetary policy
- The rise in credit supply induces an increase in consumption, exclusively in non-durables
- International financial shocks are transmitted not only through global banks but also through **regional** German banks

Thank You!

Summary Stats German households

Variable	Observations	Mean	SD	5th	95th
Δ Mortgages	1,536	-15.08	415.86	-1012.67	999.88
△Consumerloans	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

Table 10: Summary Statistics for German Households

Summary Stats euro area 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

Table 11: Summary Statistics for European Households