What Caused the Global Financial Crisis?

Ouarda Merrouche (WB) and Erlend Nier (IMF)

What do we do?

- We document how **ample liquidity** ahead of the crisis encouraged increases in **leverage sourced in wholesale funding markets.**
  - for OECD countries over 1999-2007
- We provide **evidence** on the **ultimate drivers** of the build-up
  - Was it **monetary policy** (low short rates)?
  - Was it **global imbalances** (capital flows)?
  - Did differences in the **supervisory regime** matter**?**
- We investigate whether monetary policy affected the **direction** of capital flows.

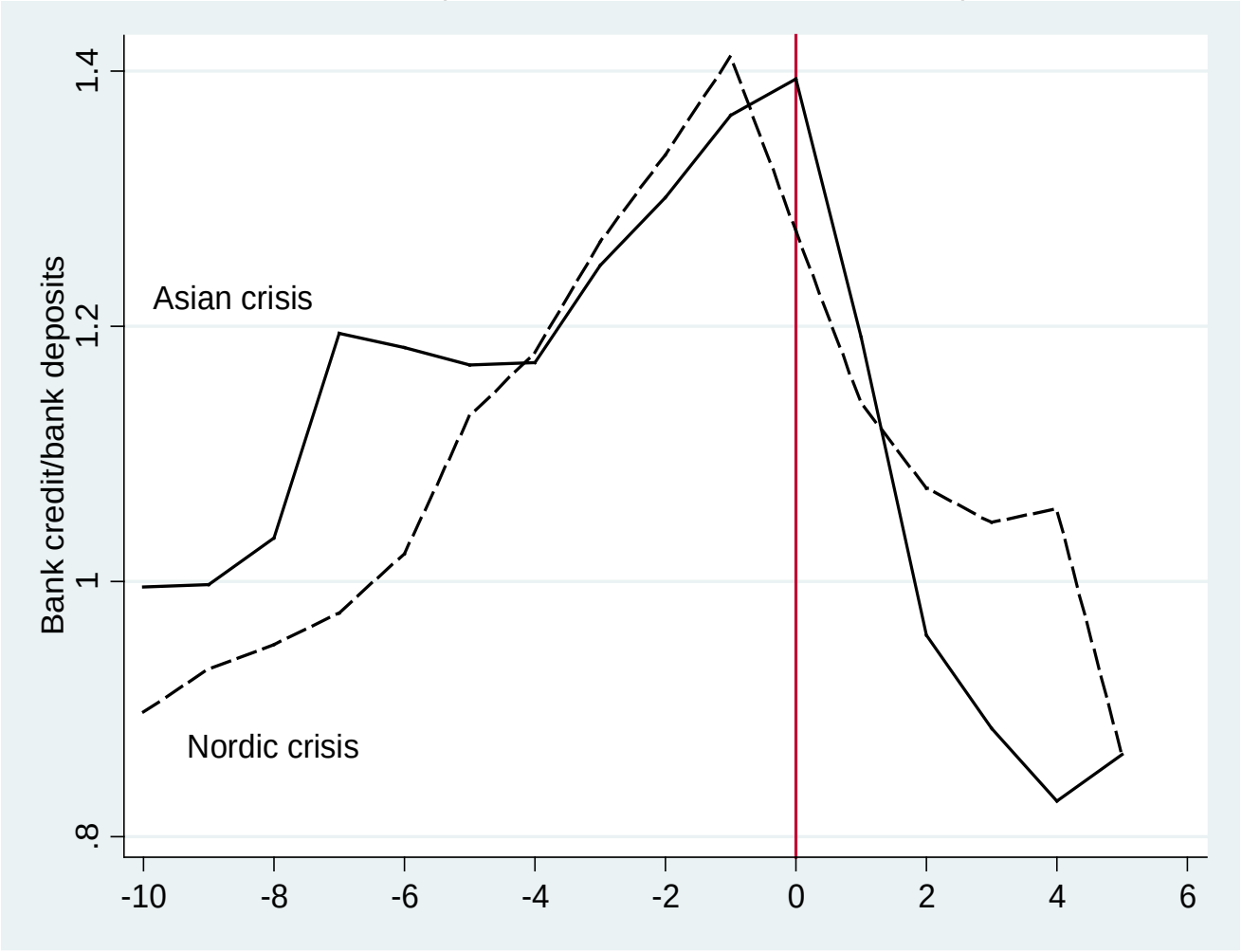
What do we find?

- Capital flows rather than low policy rates were the key driver of increases in leverage sourced in wholesale markets.
  - Capital flows reduced the spread between long and short rates, causing banks to “lever up”.
  - The effect of capital flows on financial imbalances is less pronounced where the supervisory environment was strong.
- Main findings carry through to alternative measures of financial imbalances
  - e.g. credit to GDP, household indebtedness to GDP; and house prices.
- Monetary policy had an effect on the direction of capital flows
  - Capital inflows were higher where policy rates were high relative to global rates (especially in smaller advanced economies).

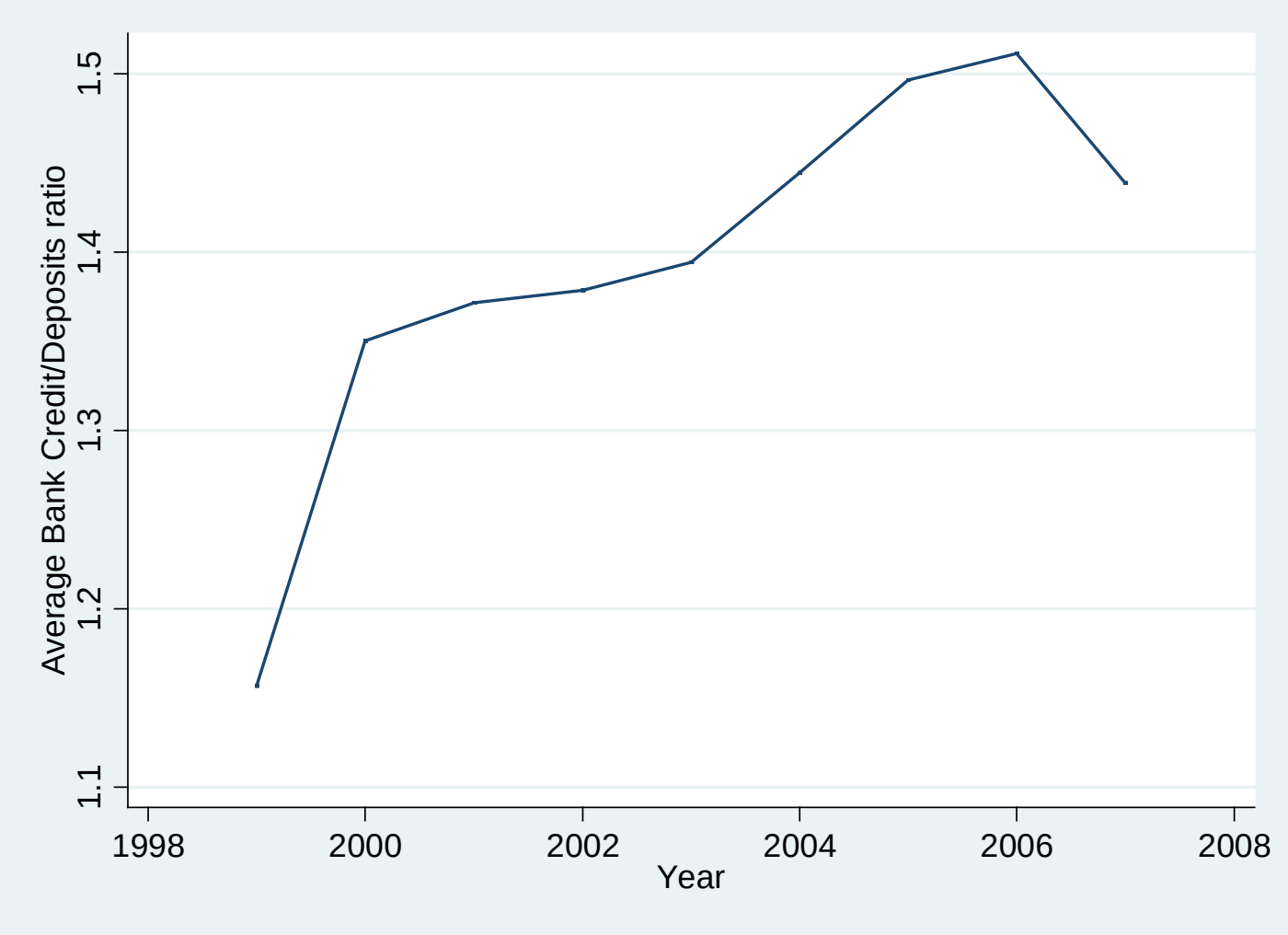
Outcome: ratio of bank credit to deposits

- Captures at country-level the build-up of leverage through expanded wholesale funding.
  - Turned into Achilles heel of the system when wholesale funding dried up from August 2007 (Oct 2008)
    - Robust predictor of distress at banking firms since August 2007 (Huang and Ratnovski, IMF)
  - Increased ahead of global crisis (and ahead of historic regional crises, such as Nordic and Asian crises).

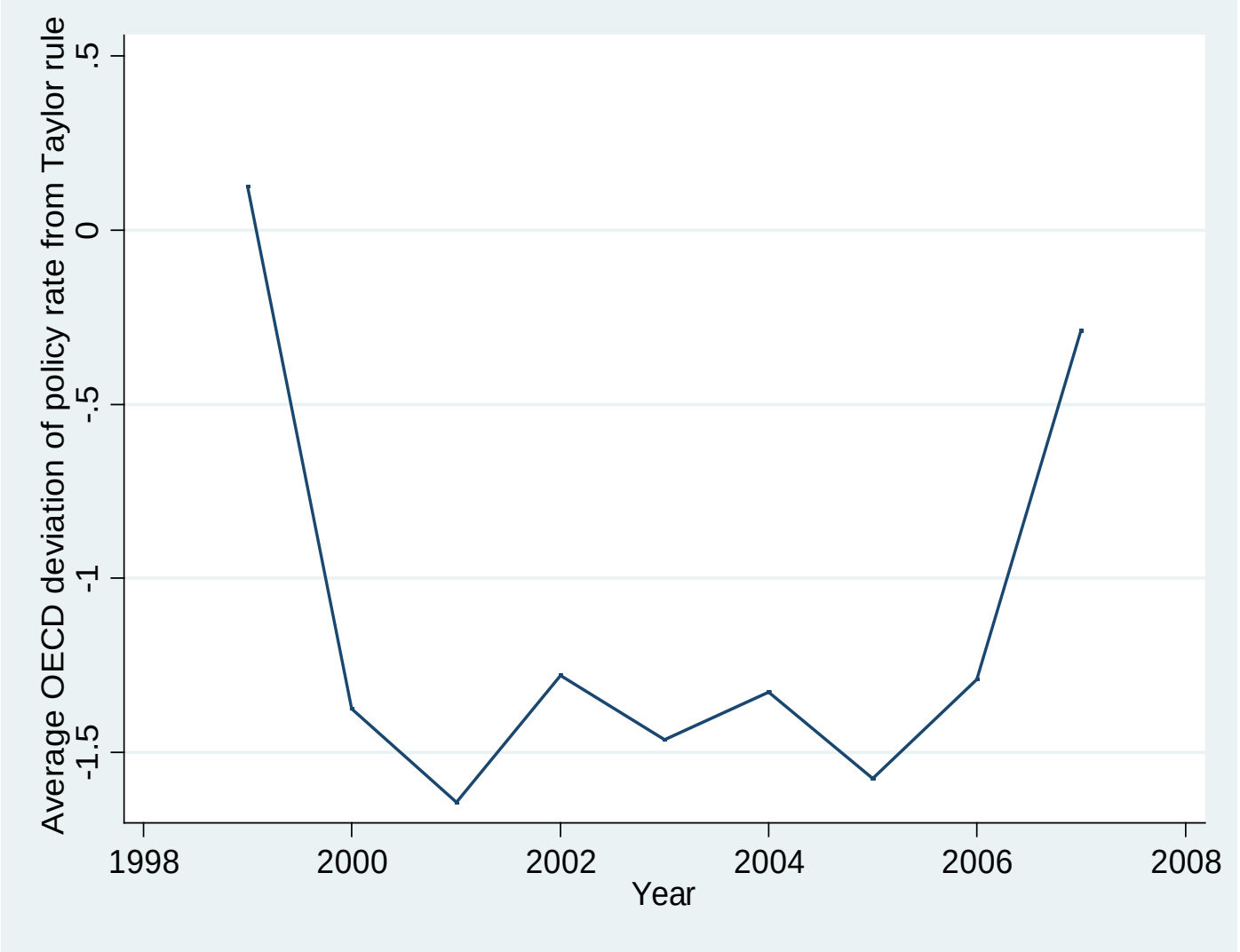
Average ratio of credit to deposits around historic crises (Nordic and Asian)



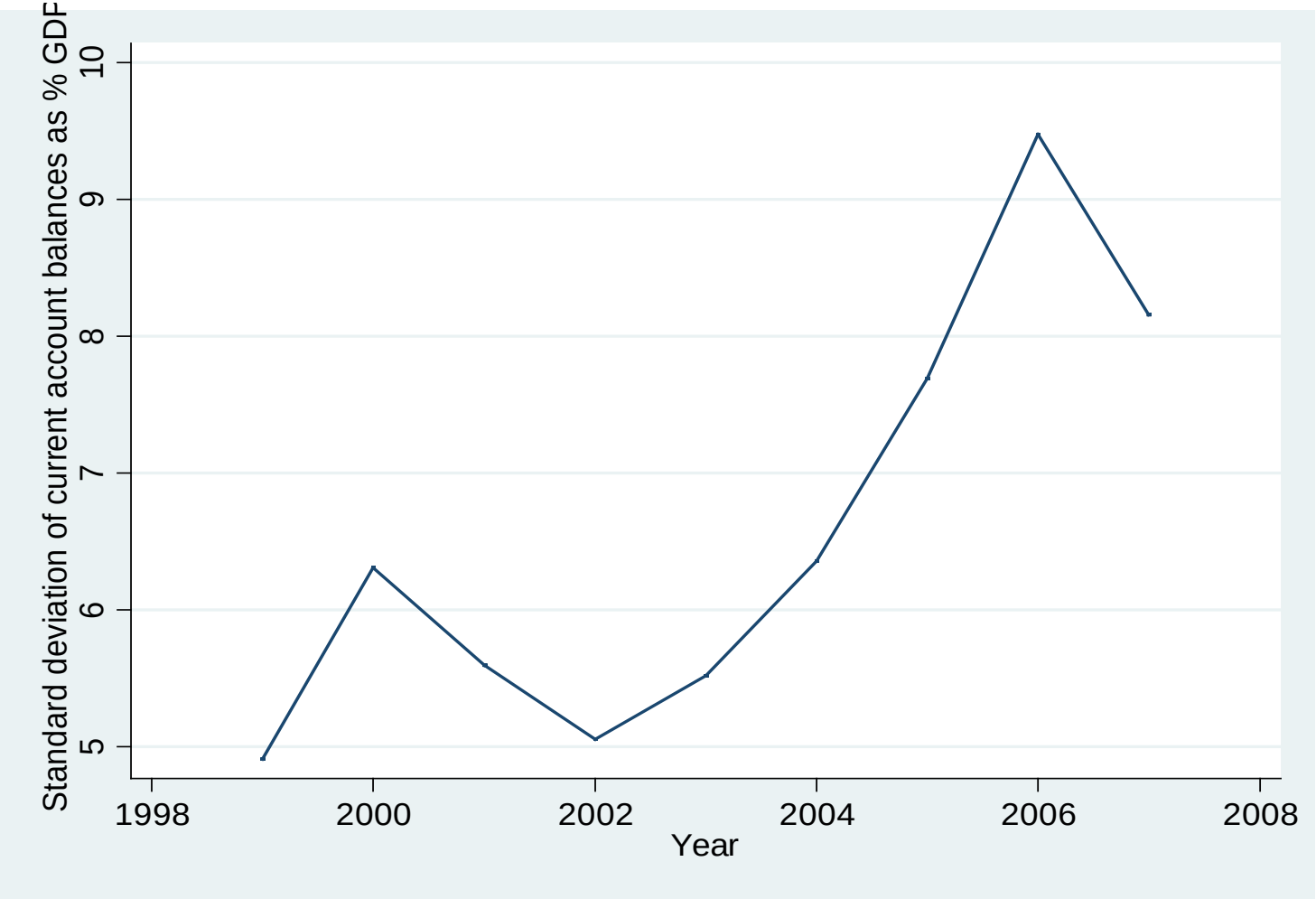
Average ratio of credit to deposits across OECD countries 1999-2007



Culprit No. 1: Monetary policy 1999-2007 (OECD)



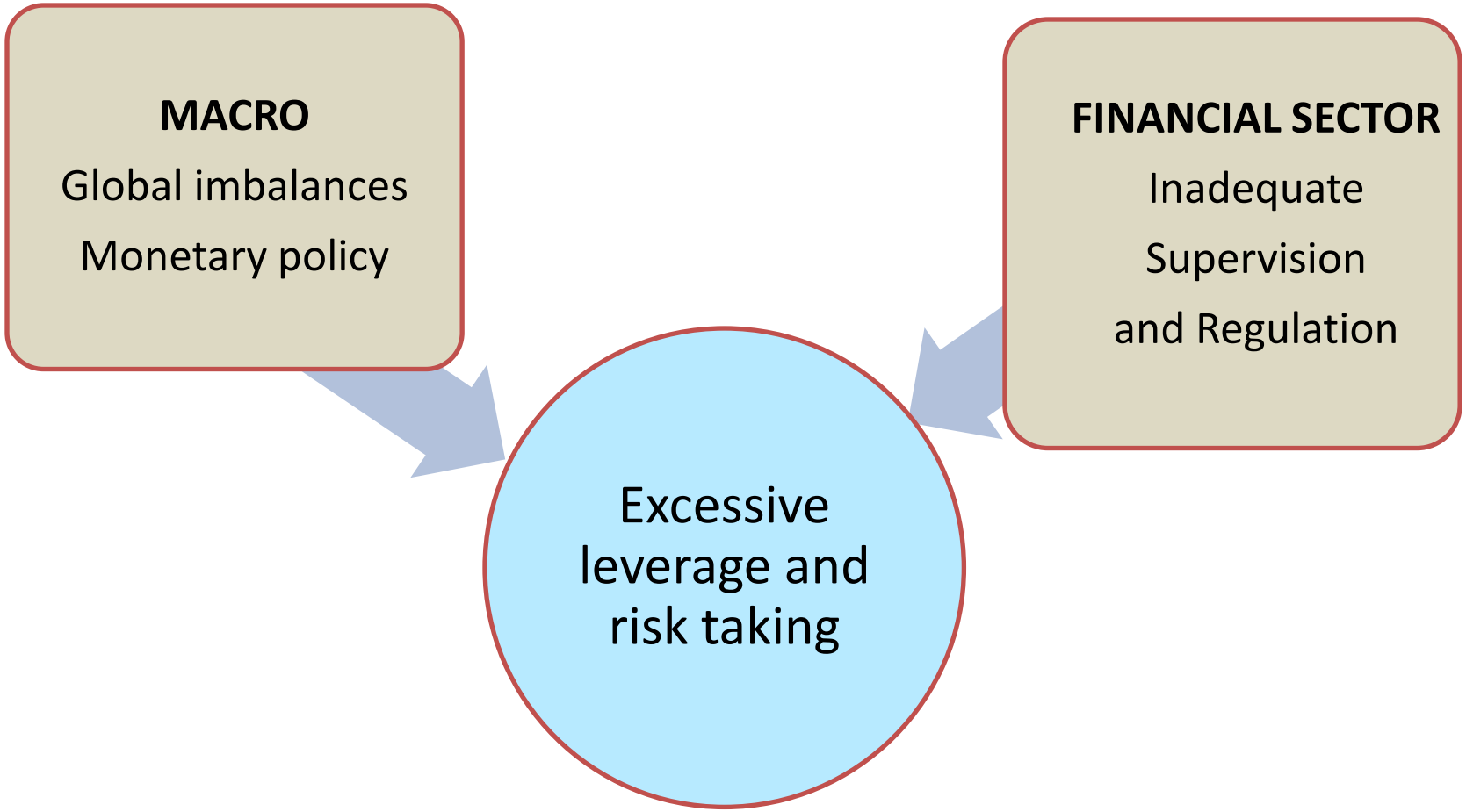
Culprit No.2: Global imbalances 1999-2007 (OECD)



Empirical approach

- For OECD countries, 1999-2007, regress outcome variable (credit to deposits) on
  - **monetary policy stance** (deviation from Taylor rule)
  - **capital flows**
    - current account
    - long-term short-term spread
  - controlling for country-fixed and year-fixed effects
- Investigate **interactions** between **macro**-and **supervisory** variables.

Interactions



Supervision and regulation

- Central bank supervision
  - May lead to tougher supervision, e.g. of liquidity
- Supervisory and resolution powers
  - May reduce moral hazard
- Restrictions on activities
  - Can facilitate supervisory monitoring and reduce moral hazard
- Entry barriers
  - Can lower competition and reduce risk taking
- Capital regulation stringency
  - Can increase resilience to shocks but may also constrain credit

Main results

Macroeconomic drivers of leverage (credit to deposits)

	(1)	(2)	(3)	(4)
Current account %GDP	-0.029**		-0.029*	
Deviation of policy rate from Taylor rule	0.018		-0.006	
Long-term-short term spread		-0.063*		-0.056**
Country FE	x	x	x	x
Year FE	x	x		
Observations	196	196	196	196
Number of countries	22	22	22	22
R-squared	0.25	0.19	0.08	0.03

Robust standard errors clustered by country in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Macro and supervisory variables - interaction effects

	(1)	(2)	(3)
	Macro-Factors		
	current account	Long-term short term spread	Monetary policy stance
Current account %GDP	-0.124**		-0.026**
Deviation of policy rate from Taylor rule	0.024		-0.07
Long term-short term spread		-0.380**	
Macro-Factor*Central bank supervision	**0.012***	**0.040*****	0.009
Macro-Factor*Supervisor power	**0.002****	**0.008*****	**0.014***
Macro-Factor*Activity restriction	-0.002	0.007	-0.006
Macro-Factor*Entry barriers	**0.016*****	**0.014***	-0.001
Macro-Factor*Capital regulation	-0.012	-0.003	-0.006
Year FE	x	x	x
Country FE	x	x	x
Observations	196	196	196
Number of countries	22	22	22
R-squared	0.34	0.23	0.29

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Robustness

Alternative outcome variables

Alternative outcome variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Credit/GDP		Financial sector credit/deposits		Household debt/GDP		House price index	
Current account %GDP	-0.038**	-0.038**	-0.031**	-0.031**	-0.013**	-0.012**	-2.242**	-2.199**
Deviation of monetary policy from Taylor rule	0.008	0.000	0.024	0.021	0.008	0.010	0.218	-1.111
Real GDP growth rate		-0.03		0.02		-0.008		-4.364*
Inflation rate		-0.014		-0.011		-0.002		-2.685
Country FE	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x
Observations	184	182	192	190	187	186	162	161
Number of countries	21	21	22	22	21	21	18	18
R-squared	0.45	0.44	0.25	0.24	0.73	0.73	0.73	0.73

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Extension

Drivers of “global imbalances”

Determinants of the current account (capital flows)

		Small countries	Large countries
	(1)	(2)	(3)
Government budget surplus %GDP	0.233	0.313	-0.087
Openess ([Exports+Imports]/GDP)	0.044	0.063	0.043
Private savings rate	0.262***	0.166	0.471**
Output growth	-0.18	-0.813	1.426**
Domestic-USA spread	-0.796**	-1.416***	0.23
	[0.305]	[0.259]	[0.313]
Country FE	x	x	x
Year FE	x	x	x
Number of observations	191	95	96
Number of countries	22	11	11
R-squared	0.33	0.44	0.34

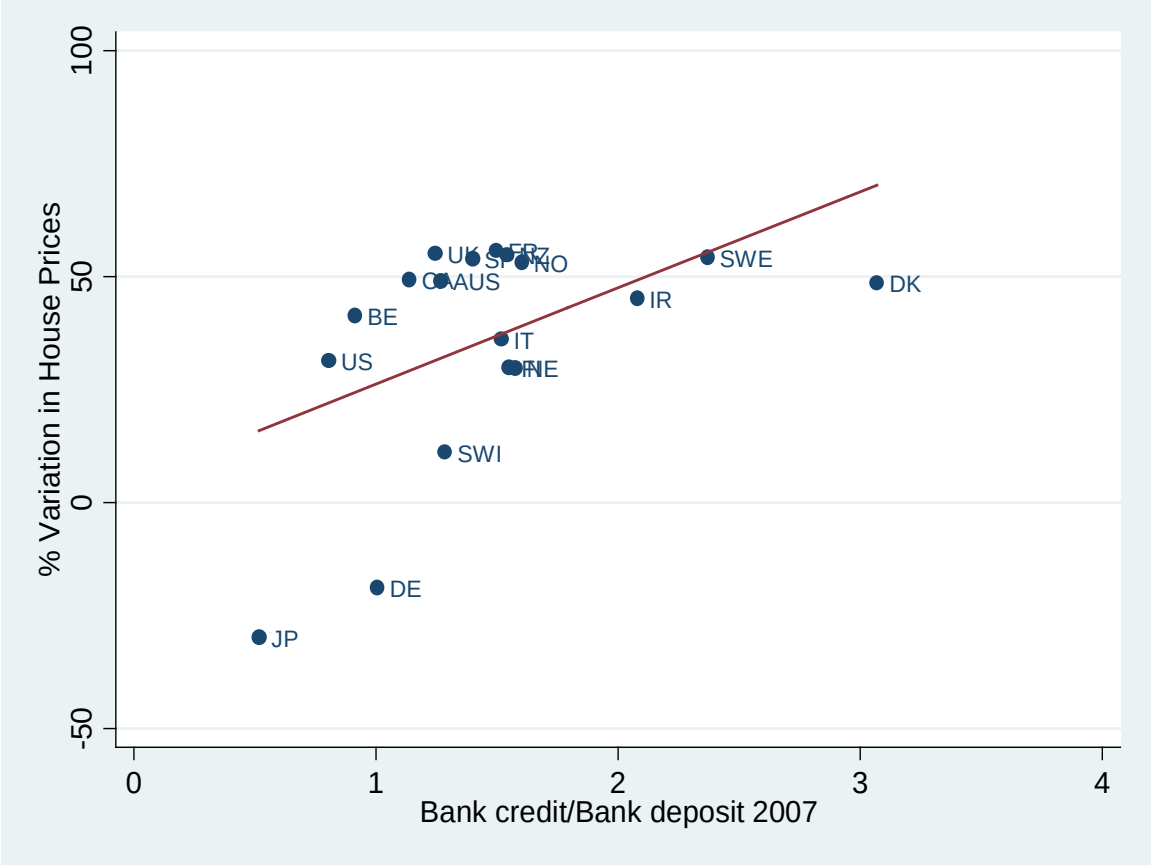
Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

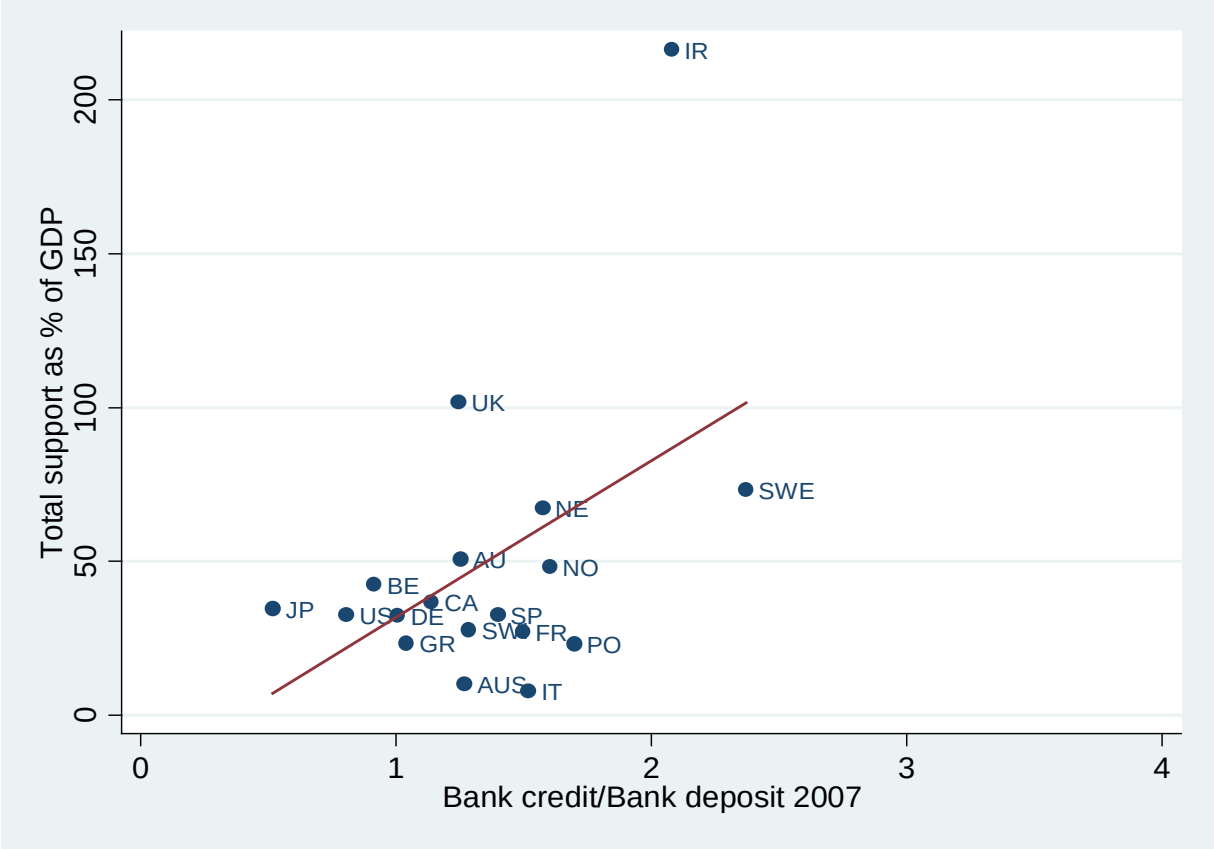
Implications for policy

- Monetary “leaning” is second-best and can be counterproductive (esp. in small countries)
- Macroprudential policies need to address vulnerabilities from capital inflows
  - countercyclical capital, charges on liquidity risks
- Evidence also supports:
  - Benefit of strong role of central banks in regulation
  - Need to address moral hazard
    - by strengthening weak supervisory and resolution powers
  - Need to reduce excessive competition

Correlation between leverage and house price increase



Correlation between leverage and Support to the financial sector



Average long-term short-term spread, OECD countries 1999-2007

Monetary policy: channels

- Loose monetary policy (a low short-term rate)
  - reduces the cost of wholesale funding and leads intermediaries to build up of leverage. (Shin)
  - increases demand for and supply of credit (mortgages) causing asset (house) prices to rise (Borio and Zhu, Taylor)

Global imbalances: channels

- Global imbalances (large capital inflows)
  - reduce long–term rates (compress spreads), causing financial institutions to lever up and "search for yield" (Bernanke, King, Rajan)
  - increase the supply of credit to the domestic economy and may cause asset bubbles (Ostry et al, Reinhart and Rogoff)

Robustness

- Alternative outcomes
- Alternative measures of monetary stance
  - e.g., prolonged deviations from Taylor
- All variables lagged (endogeneity)
- Alternative samples
  - euro area only; OECD excluding U.S.
  - boom period, 2003-2007

Economic significance

- The mean level of credit/deposits is **1.4**
  - **Current account**: a deterioration by one standard deviation (6.6 per cent) leads to an increase of **0.4** in credit /deposits.
    - **Supervisory power:** A decrease from the highest to the lowest reading leads to an increase of **0.9**
    - **Central bank** control of supervision: increase (from 0 to 2) leads to a decrease by **0.2**
    - **Entry barriers:** A decrease in the tightness from the highest to the lowest reading) leads an increase of **0.5**

Economic significance

- The mean level of credit/deposits is **1.4**
  - **Current account**: a deterioration by one standard deviation (6.6 per cent) leads to an increase of **0.4** in credit /deposits.
    - **Supervisory power:** A decrease from the highest to the lowest reading leads to an increase of **0.9**
    - **Central bank** control of supervision: increase (from 0 to 2) leads to a decrease by **0.2**
    - **Entry barriers:** A decrease in the tightness from the highest to the lowest reading) leads an increase of **0.5**