

International Bank Lending Channel of Monetary Policy

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The views expressed are those of the authors and do not represent those of the IMF, nor of the Bank of Spain or the Eurosystem.

RESEARCH QUESTION:

In a context of increasing financial integration and important changes in monetary policies:
we study the effect of domestic monetary policy on cross-border bank lending.

Two theoretical channels:

- 1. Bank lending channel:** domestic tightening => higher financing cost => reduces cross-border lending
Bruno and Shin (2015), Bräuning and Ivashina (2018), Temesvary et al. (2018)
- 2. Portfolio rebalancing:** domestic tightening => reduces domestic net worth => higher c-b lending
Cerutti et al. (2017), Correa et al. (2018), Avdjiev et al. (2018)

Mixed empirical evidence: static framework and potential endogeneity of the shocks

OUR CONTRIBUTION



We show that the lack of consensus is due to the identification of exogenous monetary policy shocks and lack of dynamic framework:

1. Identification of MP surprises:

- *US: narrative approach by Romer and Romer (RR 2004), extended by Coibion (2012)*
- *Other 8 advanced countries: two-step method by Furceri et al. (2018)*

2. Dynamic effect using Local Projection (Jordá 2005) – in line with literature on domestic bank-lending channel literature (VARs)

3. Non-linearities & channels:

- Source country state dependency (business cycle) & sign of the shock (tightening and easing)
- Global factors (financial cycle)
- Recipient's country characteristics (ex.rate regimes and capital account openness)
- Risk taking channel

PREVIEW OF RESULTS



- An exogenous domestic monetary policy tightening (both in US and other AEs) decreases cross-border bank lending => **bank lending channel**
- Comparison exogenous shocks vs. changes in policy rate => **identification of MP shock matters**
- The effect is persistence even when controlling global financial risk (VIX) or liquidity risk (Libor-OIS spread) => **MP is an independent source of the “global financial cycle”**
- There is suggestive evidence that spillovers are stronger in period of expansions (Tenreyro and Thwaites 2016)
- The effect tends to be larger during period of risk-on => suggesting that periods of **high risk might restrict portfolio adjustments** of a bank in response to MP actions.
- The effect tends to be larger for emerging markets => **risk taking channel**
- No statistically significant difference of the effect depending on capital controls and ex.rate regimes (Rey 2015)

OUTLINE

- Data
- Identification
- Methodology & results for US baseline
- Comparison with previous literature
- Robustness
- Non-linearities and risk taking channel
- Analysis for other advanced economies
- Next steps



BIS Locational Banking Statistics:

- Outstanding assets and liabilities of internationally active banks (quarterly frequency)
- Gross instead of net flows: deeper understanding of the dynamics behind the rapid expansion of gross asset and liability positions
- Classified according to residency principle:
 - *Consistent with BoP*
 - *Banks and affiliates are subject to host-country regulation or have access to local bank liquidity facilities (Avdjiev et al. 2018)*
- High correlation capital flows and banking flows
- Loans and deposits vis-à-vis all counterparty sectors
- Account for 95% of all cross-border interbank business
- Flows are expressed in USD and adjusted for movements in exchange rates
 - *Information about currency composition of banks' balance sheets: account for the valuation effect*
- Break-adjusted changes in account outstanding
- Information about geographical breakdown of counterparties: control for demand-side factors

DATA II



Our sample:

- We construct the ex.rate adjusted stock as the cumulated sum of ex.rate adjusted flows, using unadjusted claims as first observations
- **Source countries:** US (1990Q1-2008Q4), and other 8 advanced countries (2001Q1-2012Q4): Canada, Germany, Italy, Japan, Netherlands, Spain, Sweden, UK
- **EMs and AEs:** 45 countries
- Cleaning: drop offshore financial centers, drop/winsorize 1%, drop claims <\$5m or negative claims (Correa et al. 2017)

IDENTIFICATION



To capture the causal effect of spillovers, we identify unexpected monetary policy actions that are orthogonal to current and expected future macroeconomic conditions:

- **Narrative approach by RR (2004) extended by Coibion (2012):** regress changes in Fed's target interest rate at each meeting of the FOMC on Fed's real time forecasts of macro variables => **residuals**
- **Extended two-step method by Furceri et al. (2018)** (based on Auerbach and Gorodnichenko 2013) for the other source countries:
 1. Compute unexpected changes in policy rates as forecast errors of Consensus Economics
 2. Regresses these on forecasts errors on output growth and inflation forecasts and current and lagged GDP growth and inflation (extension) => **residuals**

SHOCKS: TWO-STEP FURCERI ET AL. (2018)



Source country	Standard deviation	Correlation with U.S. MP shocks (Furceri et al., 2018)	Correlation with U.S. MP shocks (Coibion, 2012)
Canada	0.215	0.592	0.441
Germany	0.169	0.120	0.098
Italy	0.238	0.076	-0.004
Japan	0.065	0.211	-0.101
Netherlands	0.192	0.181	0.069
Spain	0.198	0.011	-0.071
Sweden	0.184	0.107	-0.026
U.K.	0.231	0.160	-0.041
U.S.	0.341	1.000	0.619

METHODOLOGY: US BASELINE



Local Projections:

- Exogenous shocks by construction
- Flexible in terms of fixed effect and non-linearities
- Correlation of errors across country controlled by clustering by time

Specification:

$$y_{j,t+h} - y_{j,t-1} = \alpha_j^h + \beta^h MPshock_t + \sum_{p=1}^n \gamma^h X_{j,t-p} + \varepsilon_{j,t+h}$$

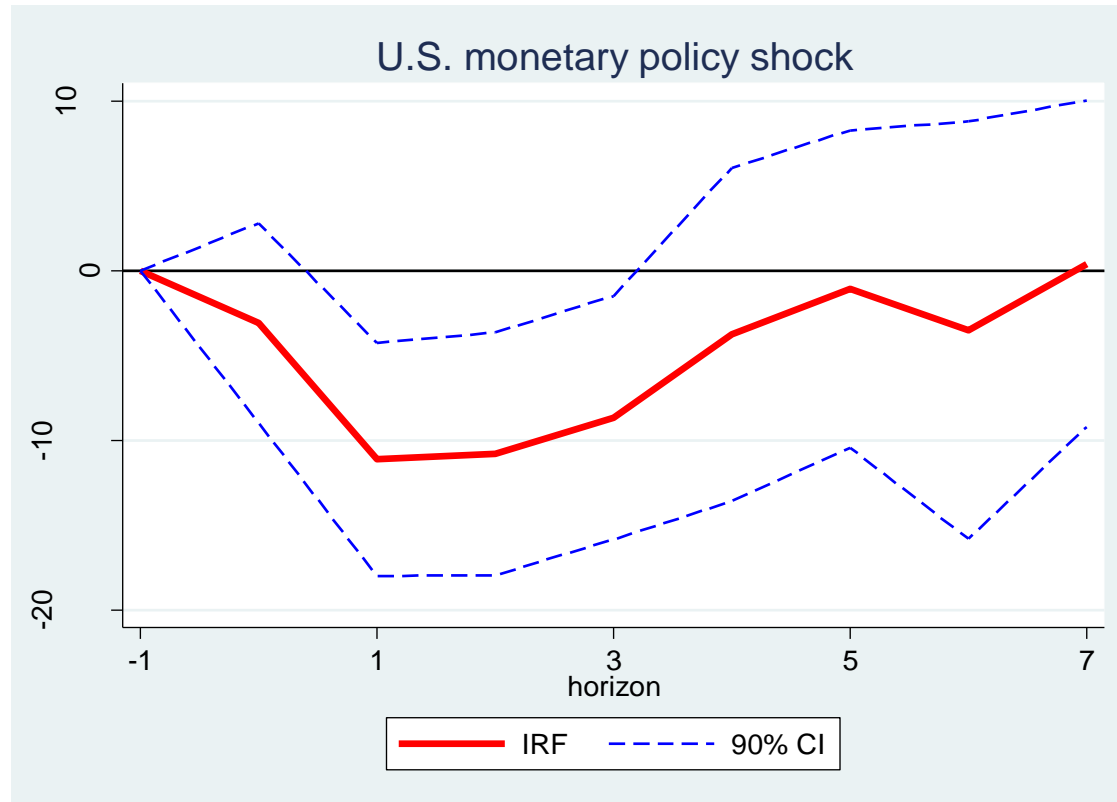
where:

- $y_{j,t+h} - y_{j,t-1}$ is the log-difference of ex.rate adjusted cross-border claims from US located Banks to borrowers in country j at different horizons h (h=7, namely 2 years)
- α_j^h is a recipient-country FE
- $X_{j,t-p}$ is a set of controls (lags of dependent and MP shocks as well as real GDP growth, short term interest rate, inflation and nominal ex.rate of the recipient country) - we use 4 lags
- No need to add macro variables of the source country - robustness

US BASELINE RESULTS DYNAMIC FRAMEWORK



Effect of a 100 bp U.S. exogenous monetary policy shock on cross-border bank lending



COMPARISON: STATIC FRAMEWORK

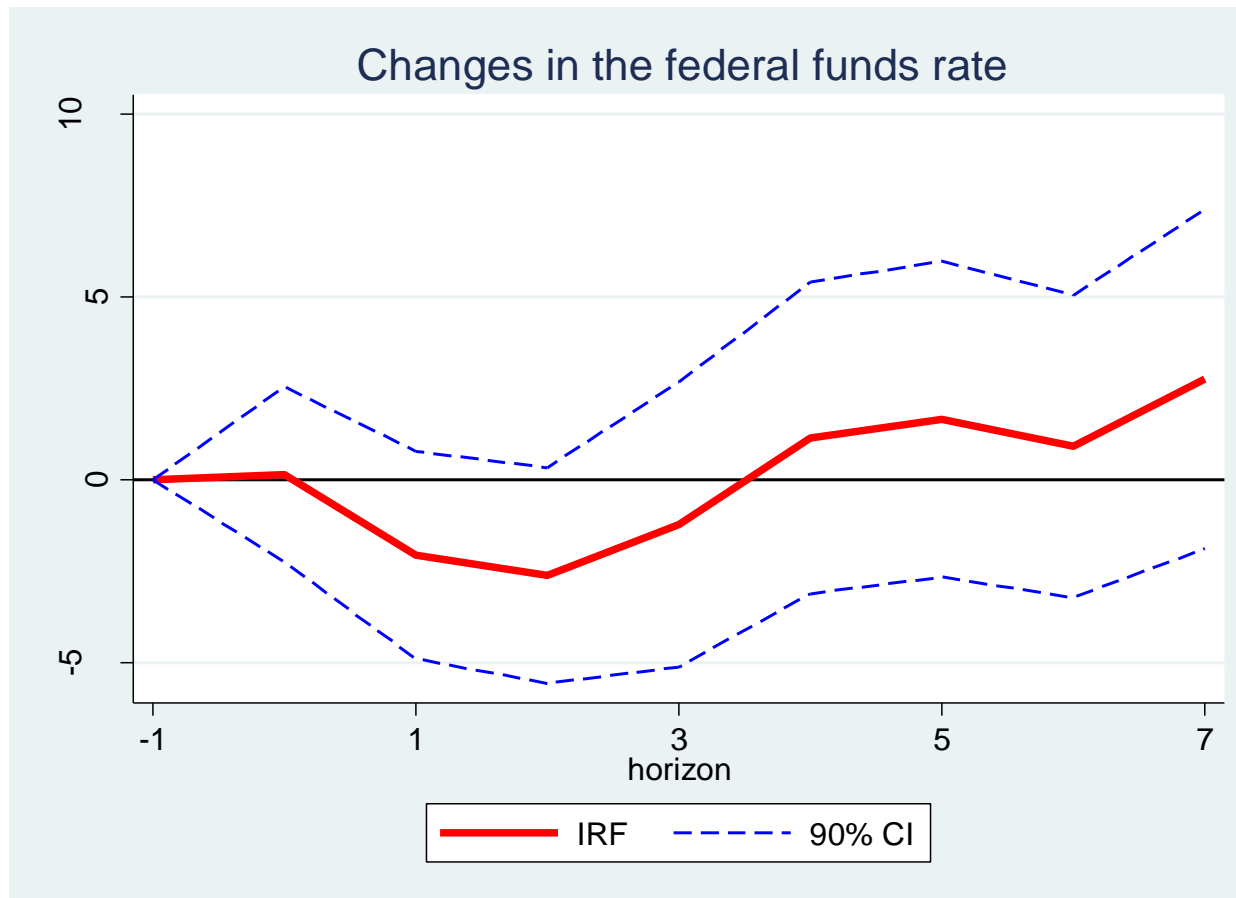


Growth rate of exchange rate-adjusted U.S. bilateral cross-border claims	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged federal funds rate	0.707** (0.298)			0.609** (0.282)		
Changes in federal funds rate		0.786 (1.573)			0.826 (1.55)	
Monetary policy shock			-0.338 (3.201)			-0.309 (3.174)
Lagged GDP growth (U.S.)	0.657 (1.429)	0.81 (1.556)	0.997 (1.521)	0.534 (1.423)	0.688 (1.545)	0.882 (1.511)
Lagged stock returns (U.S.)	0.19 (0.133)	0.169 (0.132)	0.18 (0.134)	0.195 (0.132)	0.175 (0.13)	0.186 (0.133)
Lagged inflation rate (U.S.)	-3.26 (1.961)	-2.208 (1.818)	-2.42 (1.854)	-3.322 (1.911)	-2.262 (1.76)	-2.485 (1.794)
Lagged GDP growth (recipient)	-0.57 (0.627)	-0.472 (0.624)	-0.435 (0.631)	-0.346 (0.604)	-0.335 (0.595)	-0.299 (0.604)
Lagged short-term interest rate (recipient)	0.004 (0.094)	0.072 (0.091)	0.07 (0.09)	0.036 (0.08)	0.078 (0.08)	0.076 (0.079)
Lagged inflation (recipient)	0.26 (0.449)	0.227 (0.455)	0.219 (0.456)	0.257 (0.404)	0.174 (0.408)	0.166 (0.408)
Lagged exchange rate growth (recipient)	-0.370*** (0.128)	-0.344** (0.131)	-0.336** (0.131)	-0.371*** (0.129)	-0.345** (0.132)	-0.337** (0.131)
Obs	3,293	3,293	3,293	3,293	3,293	3,293
R-squared	0.02	0.02	0.02	0.01	0.01	0.01
Recipient country-fixed effect	Yes	Yes	Yes	No	No	No

COMPARISON: DYNAMIC FRAMEWORK



Effect of a 100 bp increase in the fed funds rate on cross-border bank lending



ROBUSTNESS



Our findings are robust to:

- inclusion of domestic control variables (U.S. real GDP growth, inflation rate, and stock returns)
- different lag length selections (8)
- alternative way of computing and clustering standard errors (Driscoll-Kraay)
- controlling for time-varying country-pair variables such as bilateral trade flows.
- controlling for global financial (log VIX) and liquidity risks (Libor-OIS) (omitted variable biased)

NON-LINEARITIES & CHANNELS



- Source country characteristics
 - ❖ *economic cycle: expansion vs. recession*
 - ❖ *Sign of MP shock*
- Global financial cycles: risk-on vs. risk off
- Recipient country characteristics : exchange rate and capital openness
- Risk-taking

EXPANSION VS. RECESSION

Following the literature of state dependency effect of fiscal and monetary policy:

$$y_{j,t+h} - y_{j,t-1} = F(z_t) \left(\alpha_{R,j}^h + \sum_{p=1}^n \gamma_R^h X_{j,t-p} + \beta_R^h MP_t \right) + (1 - F(z_t)) \left(\alpha_{E,j}^h + \sum_{p=1}^n \gamma_E^h X_{j,t-p} + \beta_E^h MP_t \right) + \varepsilon_{j,t+h}$$

$$F(z_t) = \frac{\exp(-\theta z_t)}{1 + \exp(-\theta z_t)} \text{ and } \theta > 0$$

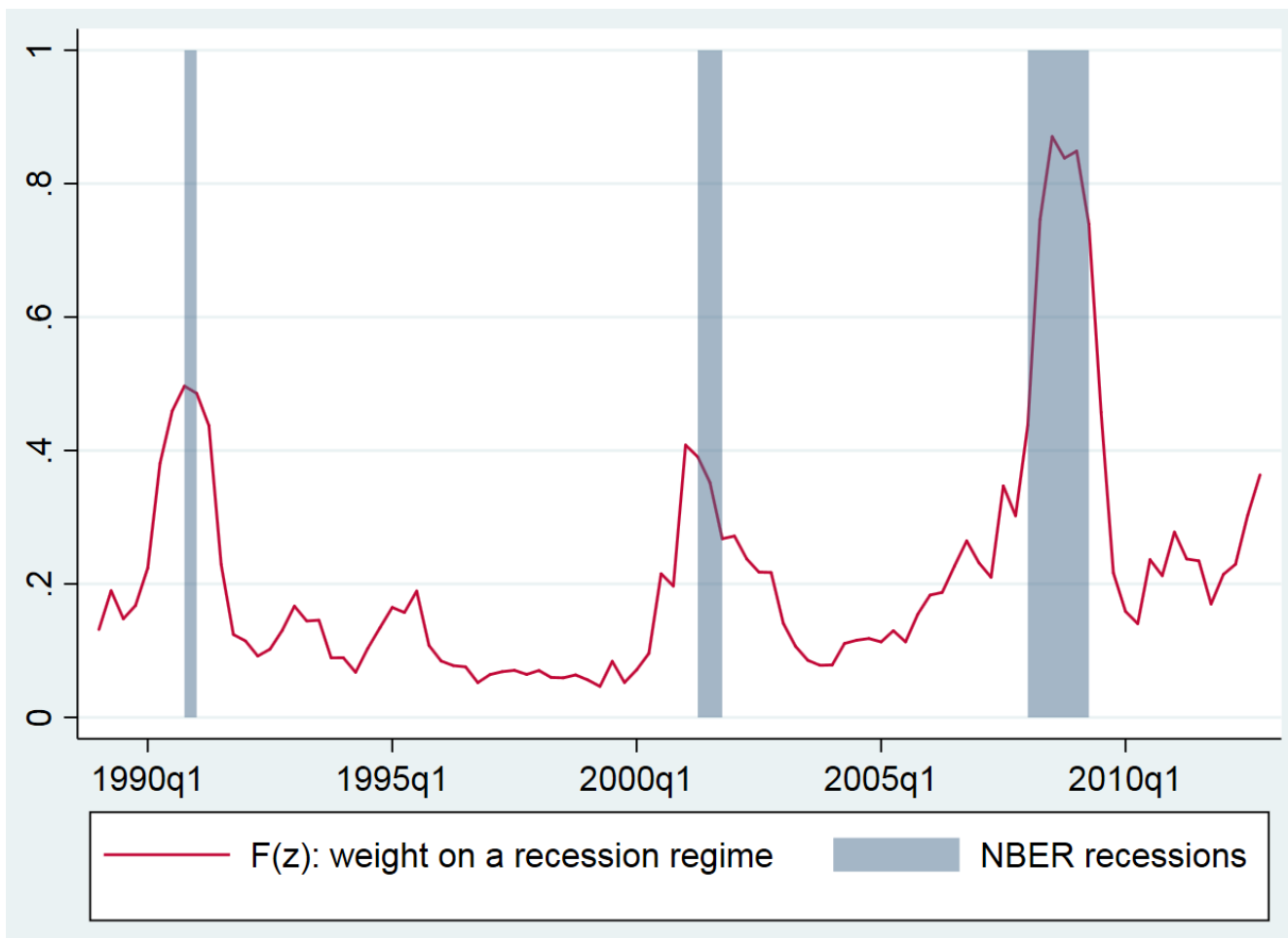
Where

- $F(z_t)$ is a smooth transition function
- z_t is a indicator of the state of the economy: 5-quarter MA of real GDP normalized (0,1)
- $\theta = 1.5$ (AG 2012) corresponds to 20% of the time in recession

Advantages (Granger and Terasvirta (1993)):

- it directly tests whether the effect of monetary policy shocks on cross-border banking flows varies across different regimes
- it allows the effect of monetary policy shocks to change smoothly between recessions and expansions by considering a continuum of states – IRF more stable and precise
- it captures well the NBER recession dates

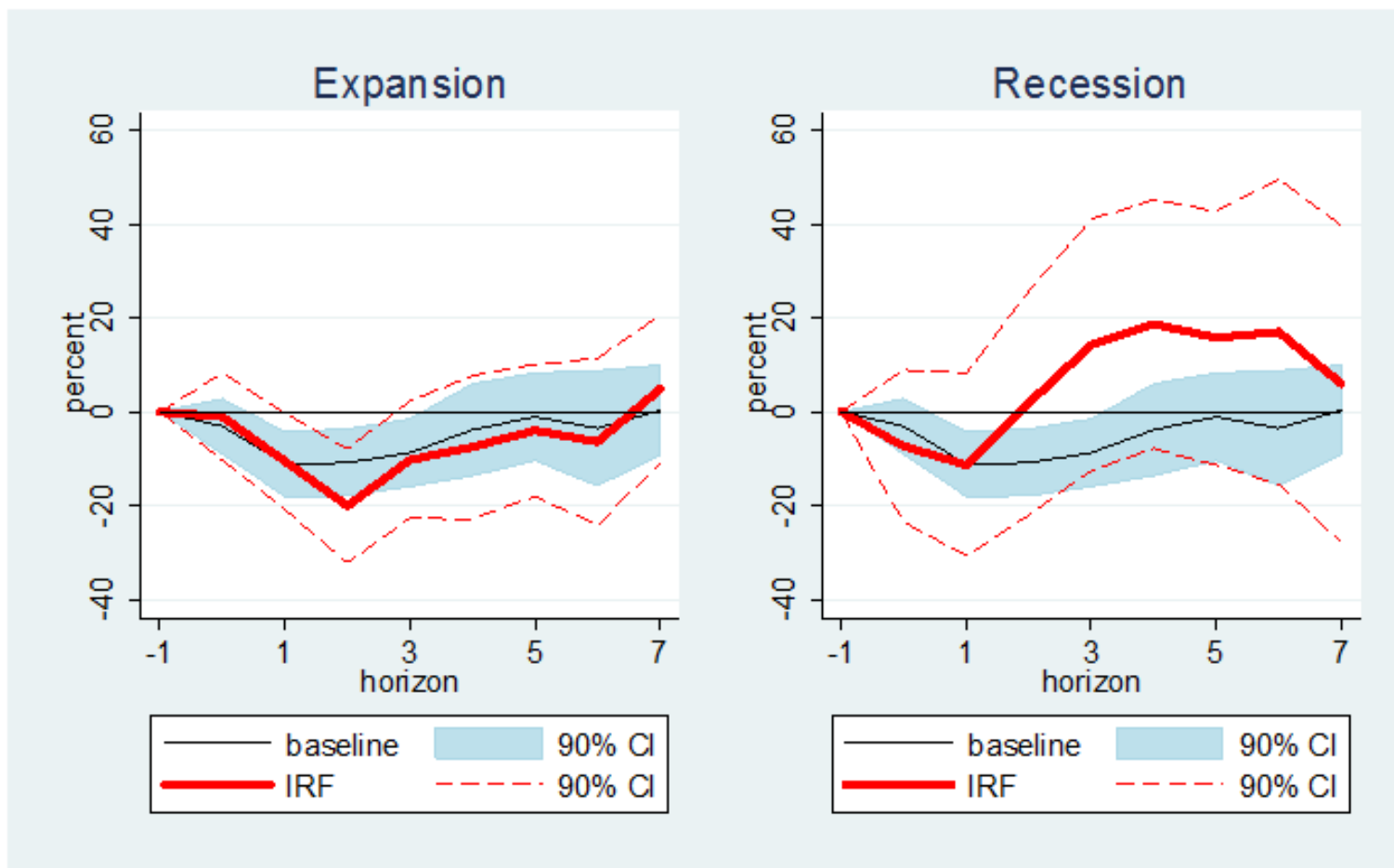
NBER RECESSION DATES AND THE WEIGHT ON A RECESSION REGIME



EXPANSIONS VS. RECESSIONS I



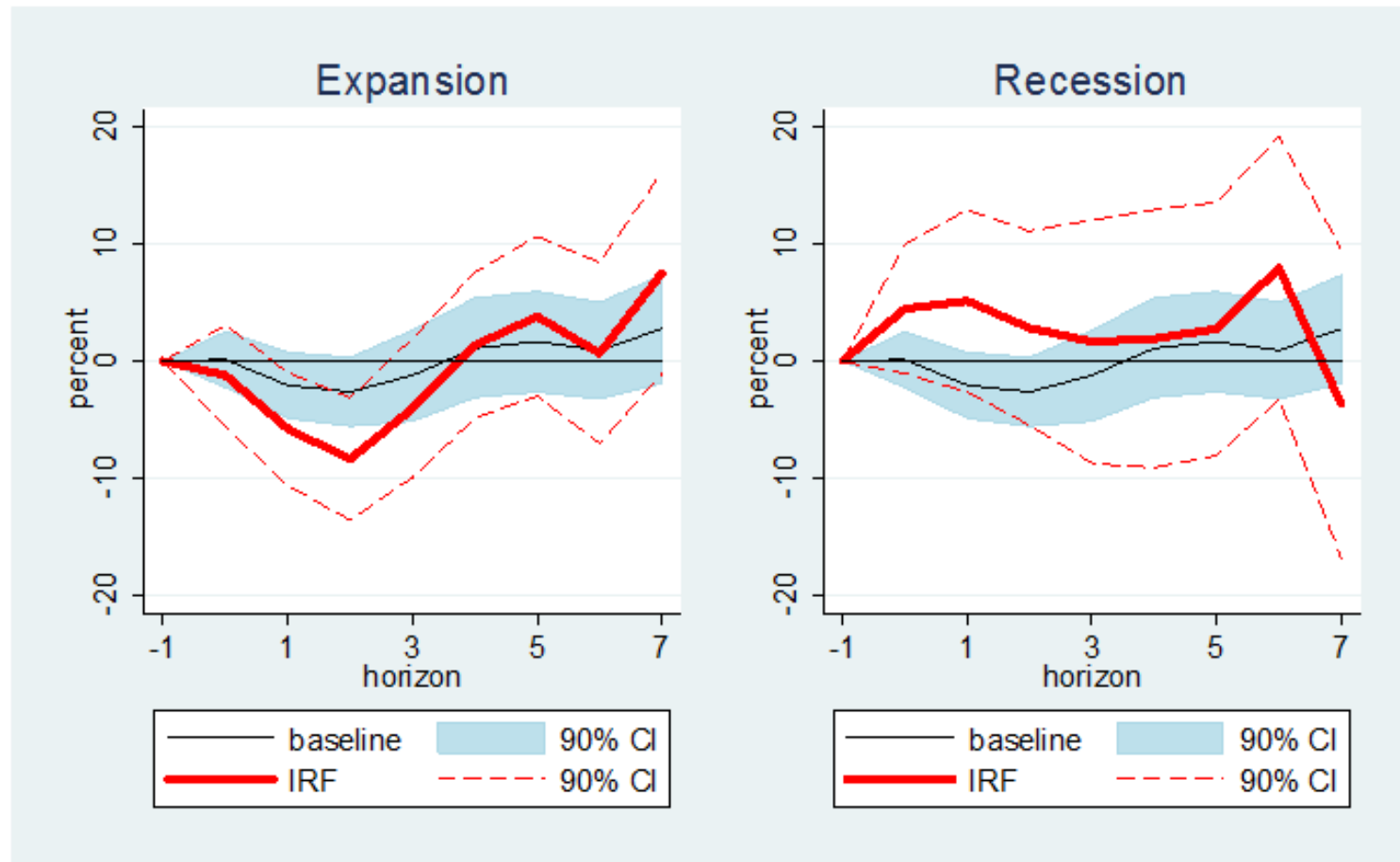
Exogenous monetary policy shocks



EXPANSIONS VS. RECESSIONS II



Changes in the federal funds rate

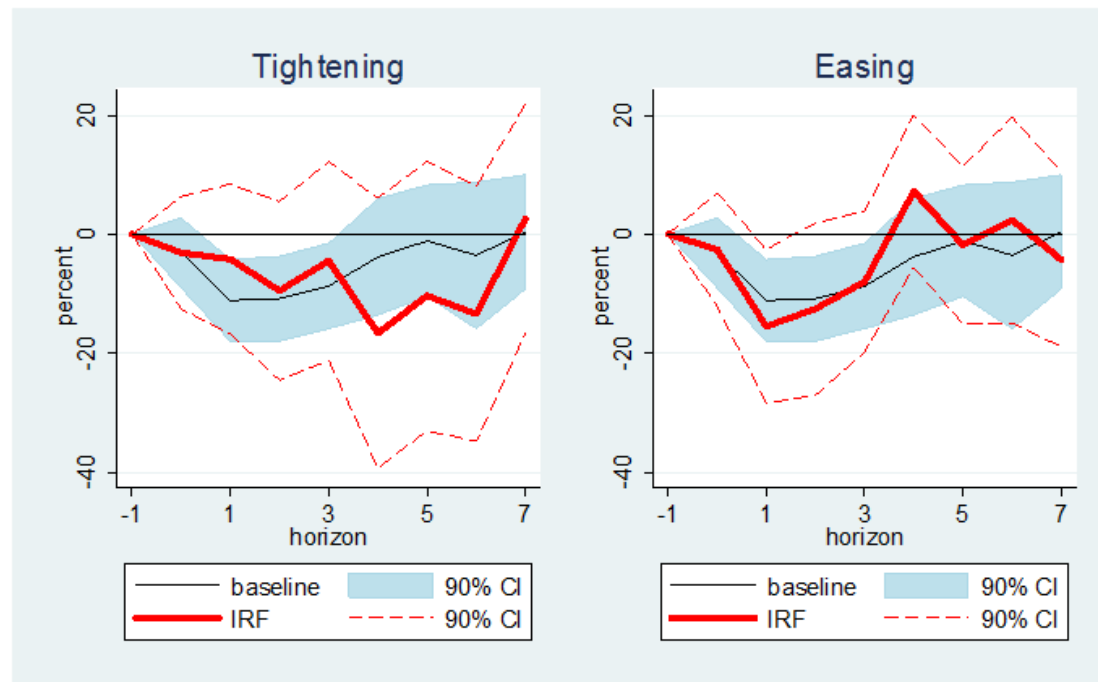


TIGHTENING VS. EASING



$$y_{j,t+h} - y_{j,t-1} = \alpha_j^h + \beta_+^h D_t MP_t + \beta_-^h (1 - D_t) MP_t + \sum_{p=1}^n \gamma^h X_{j,t-p} + \varepsilon_{j,t+h}$$

- D_t is a dummy variable that takes a value of one for monetary policy tightening and zero otherwise
- β_+^h and β_-^h capture the effect of a monetary tightening and easing



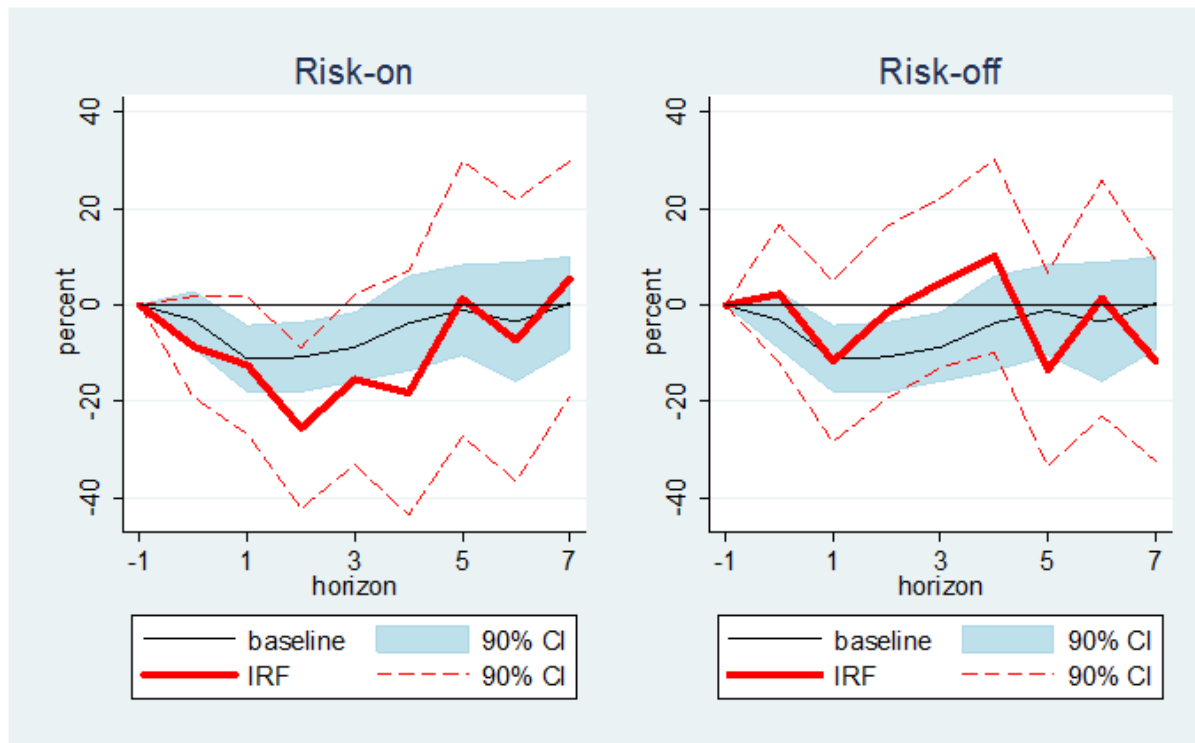
RISK-ON VS. RISK OFF



The global financial cycle fluctuates between:

- **Risk-off:** sell-off of risky assets (off from risk), low VIX, high risk aversion
- **Risk-on:** purchase of risky assets (take on risk), high VIX, low risk aversion

We apply the smooth function approach but using the global financial risk regime based on VIX:



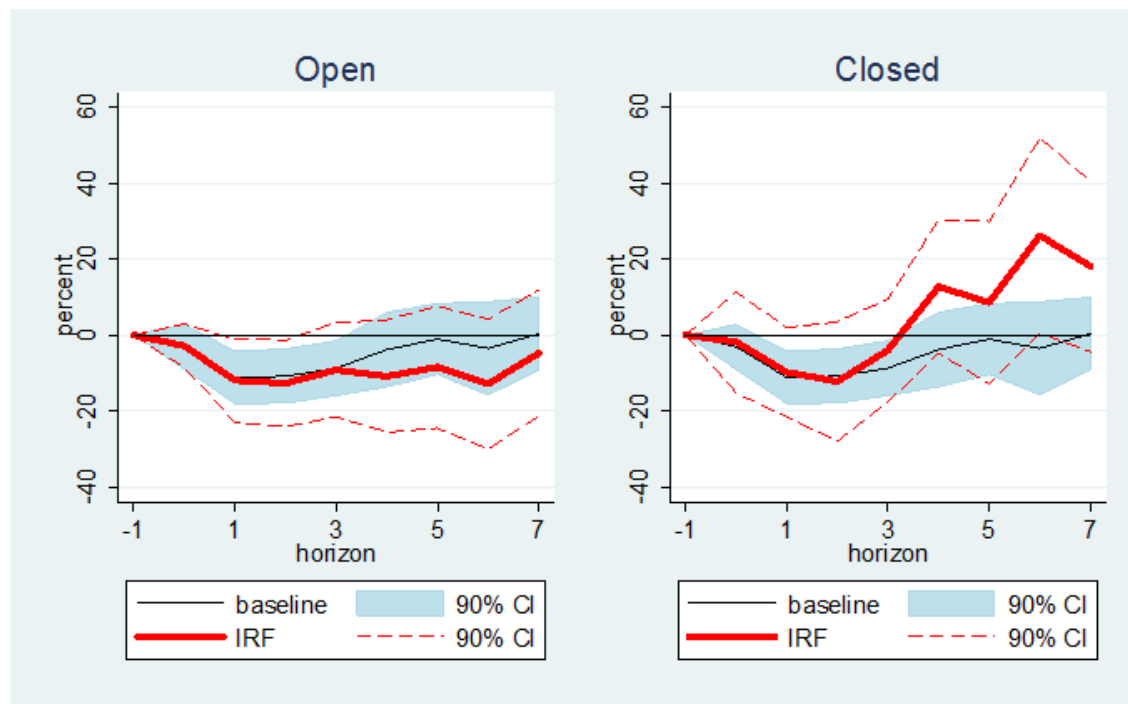
RECIPIENT COUNTRY CHARACTERISTICS : OPENNESS



How recipient country characteristics affect the cross-border bank lending channel of U.S. monetary policy?

Can fixed exchange rate regime or capital controls in recipient countries help to insulate against spillovers?

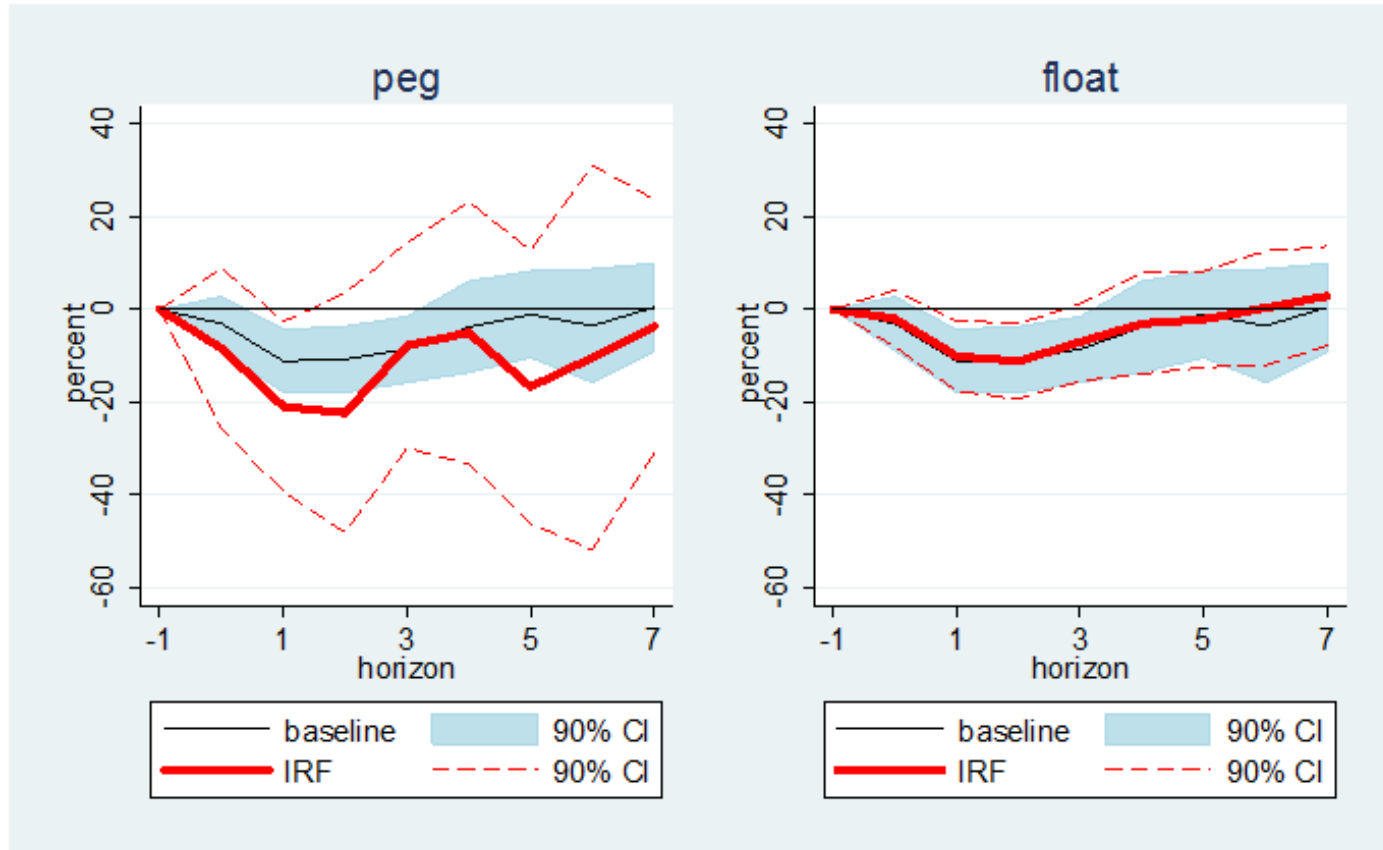
Capital account openness: *de jure* measure using the updated version of the Chinn-Ito index (Chinn and Ito, 2008), considering the median as threshold.



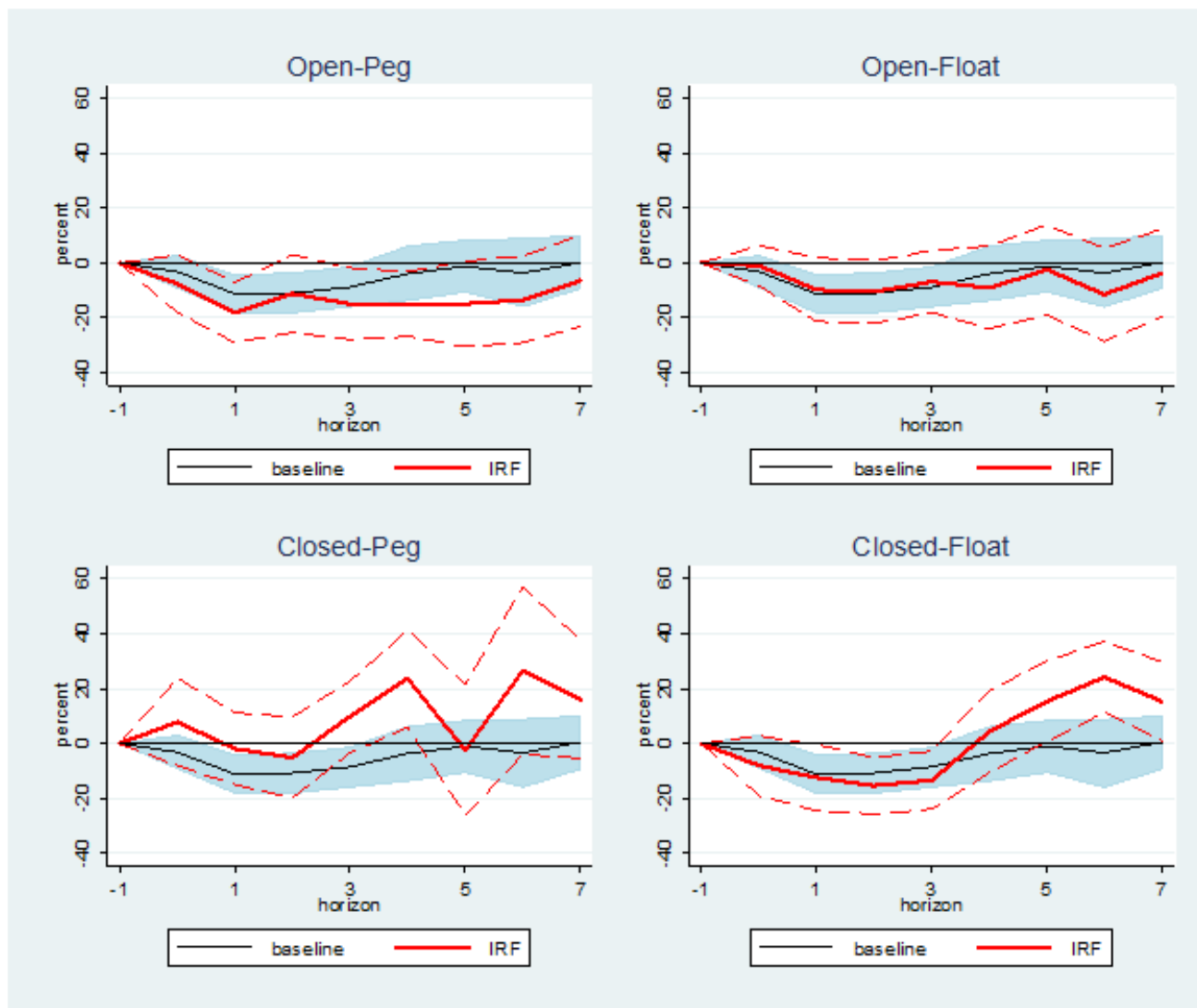
RECIPIENT COUNTRY CHARACTERISTICS : EXCHANGE RATE



Pegged exchange rate regime: updated version of binary regime classification by Shambaugh (2004) to sort out *de facto* pegged and floating exchange rate regimes.



RECIPIENT COUNTRY CHARACTERISTICS : INTERACTION



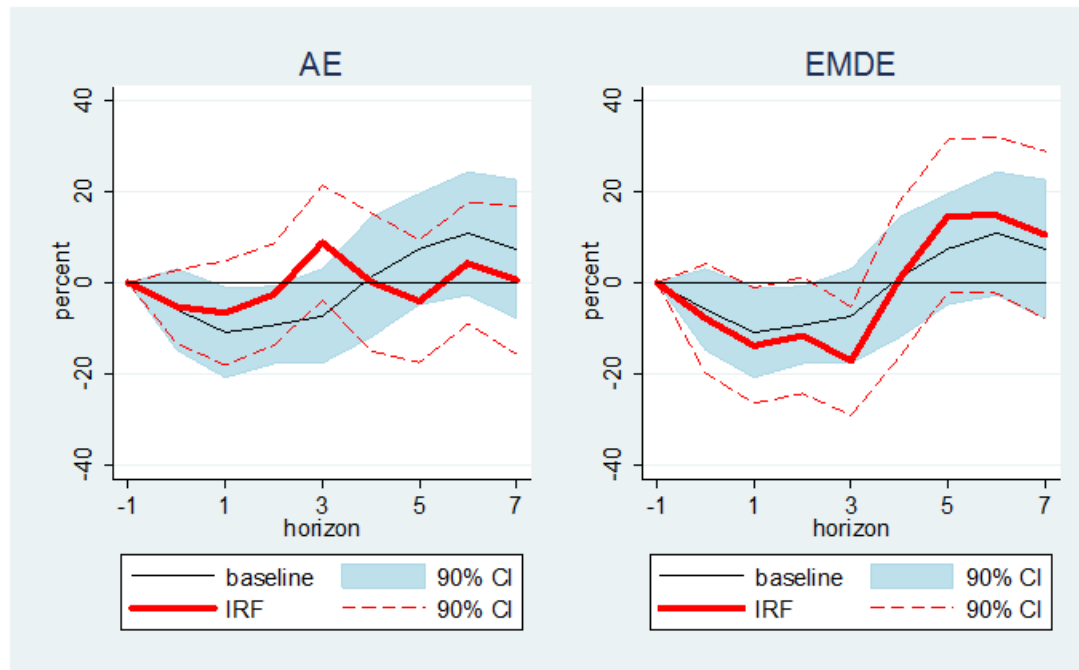
RISK TAKING CANNEL OF US MP



Brauning and Ivashina (2018): higher volatility in the volume of banking loans in emerging economies across the US monetary policy cycle than borrowers in advanced economies.

Temesvary (2017): cross-border lending of U.S. global banks toward low-income countries is more sensitive to U.S. monetary tightening using U.S. bank-level data.

We considered advanced vs. emerging economies excluding the pegged ex.rate countries:



OTHER ADVANCED ECONOMIES



Cross-border banking flows effects of domestic MP policies in 8 advanced economies (2001Q1 to 2012Q4)

We exploit the bilateral panel structure of the data (Cetorelli and Goldberg (2011)):

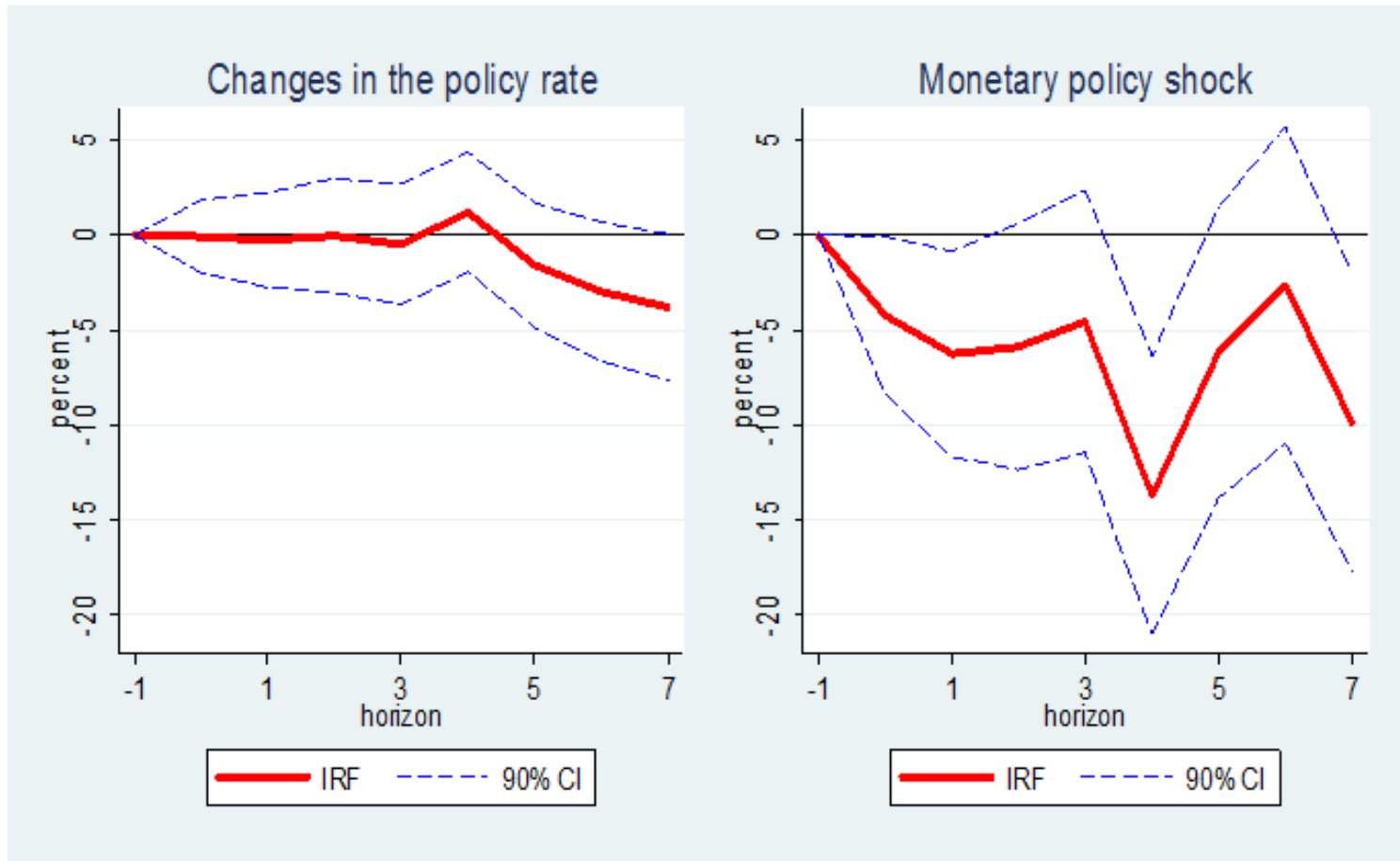
$$y_{i,j,t+h} - y_{i,j,t-1} = \alpha_{i,j}^h + \alpha_{j,t}^h + \beta^h MPshock_{i,t} + \sum_{p=1}^n \gamma^h X_{i,j,t-p} + \varepsilon_{i,j,t+h}$$

$y_{i,j,t}$ is the log of cross-border lending from global banks located in a country i to borrowers in countries j in time t .

Advantages:

- ✓ it mitigates concerns about reverse causality
- ✓ the inclusion of the fixed effects $\alpha_{i,j}^h$ allows us to control for macroeconomic factors affecting credit demand condition in recipient economies
- ✓ the recipient country-time fixed effects largely control for an autocorrelation issue
- ✓ it maximizes the sample coverage because some recipient countries do not necessarily have data on control variables.

RESULTS: OTHER ADVANCED ECONOMIES



CONCLUSIONS



- An exogenous domestic monetary policy tightening decreases cross-border bank lending => **bank lending channel**
- Comparison exogenous shocks vs. changes in policy rate => **identification of MP shock matters**
- The effect is persistence even when controlling global financial risk (VIX) or liquidity risk (Libor-OIS spread) => **MP is an independent source of the “global financial cycle”**
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- No statistically significant difference of the effect depending on capital controls and ex.rate regimes (Rey 2015)

NEXT STEPS

- Use country rating as proxy for risk taking
- Extended the sample till 2016:
 - *pre-quantitative easing (QE) and QE*
 - *Identification of structural shocks using high-frequency data and instrumental variable approach (similar to Gertler and Karadi 2015).*



THANKS FOR YOUR ATTENTION

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BANCO DE **ESPAÑA**
Eurosistema

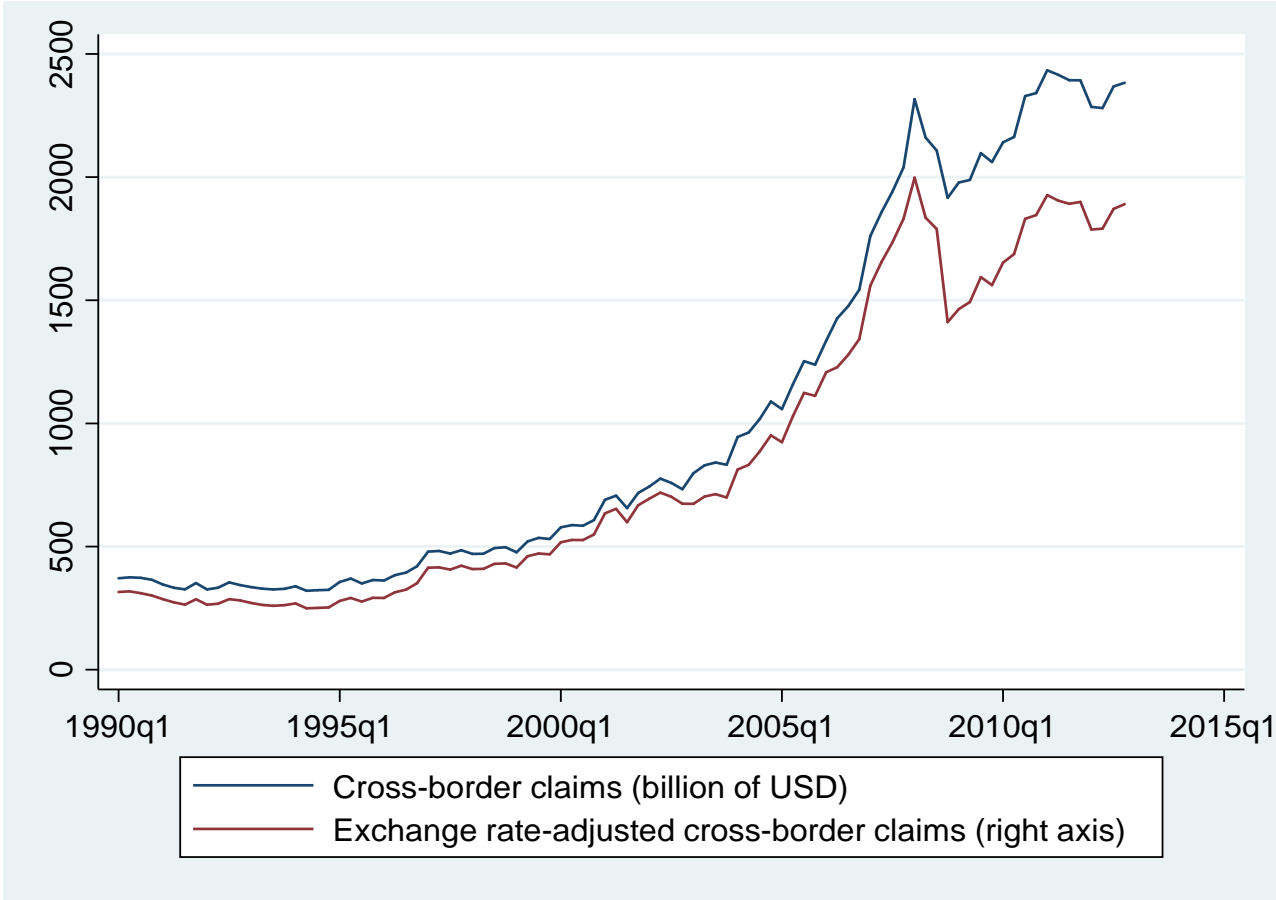
International Economics and Euro Area Department



Total cross-border claims and liabilities as a share of GDP (2014)

	Total cross-border claims as a share of GDP	Total cross-border liabilities as a share of GDP
Canada	88.99	66.26
Germany	289.92	130.79
Italy	101.95	127.21
Japan	162.92	72.29
Netherlands	524.19	469.70
Spain	135.20	171.35
Sweden	278.91	169.49
U.K.	643.95	379.29
U.S.	63.55	49.65

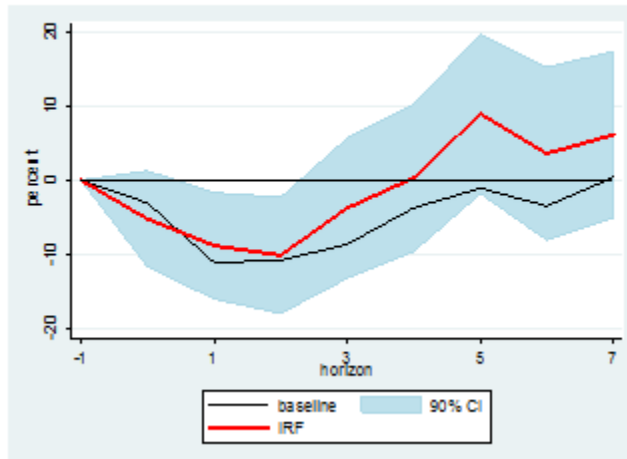
VALUATION MATTERS



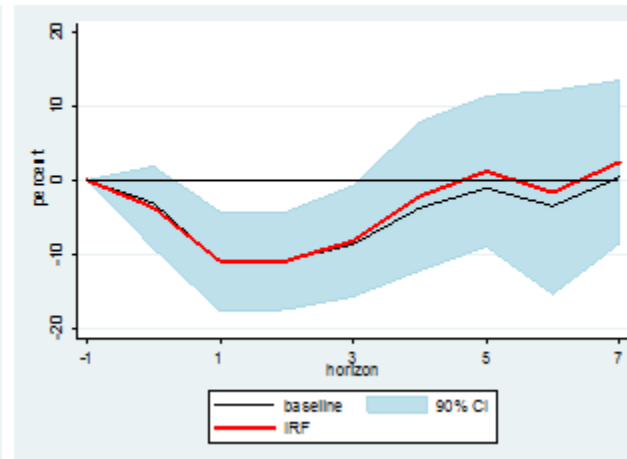
ROBUSTNESS CHECKS I



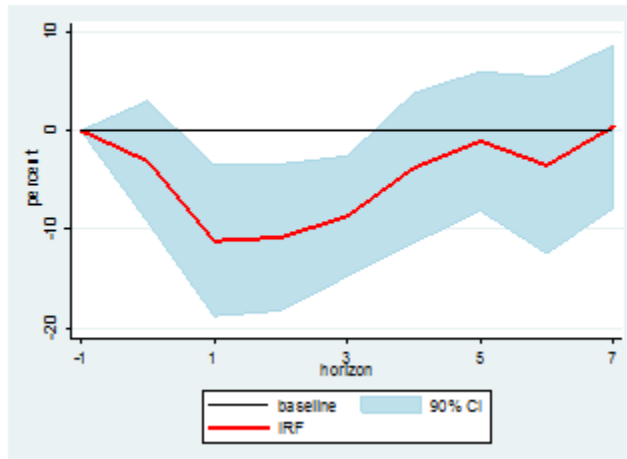
A) Controlling for domestic variables



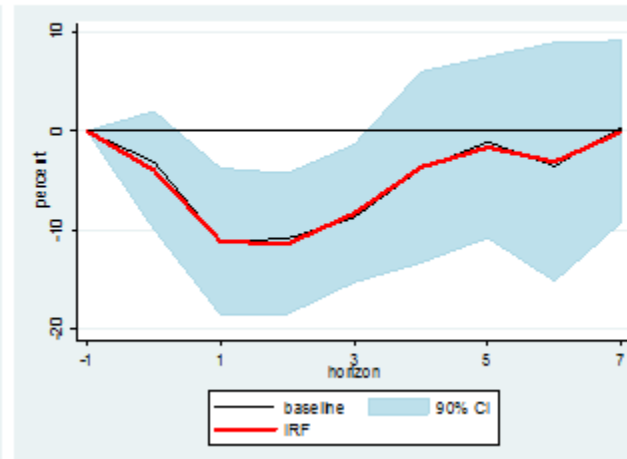
B) Using eight lags



C) Driscoll-Kraay standard errors



D) Controlling for bilateral trade flows

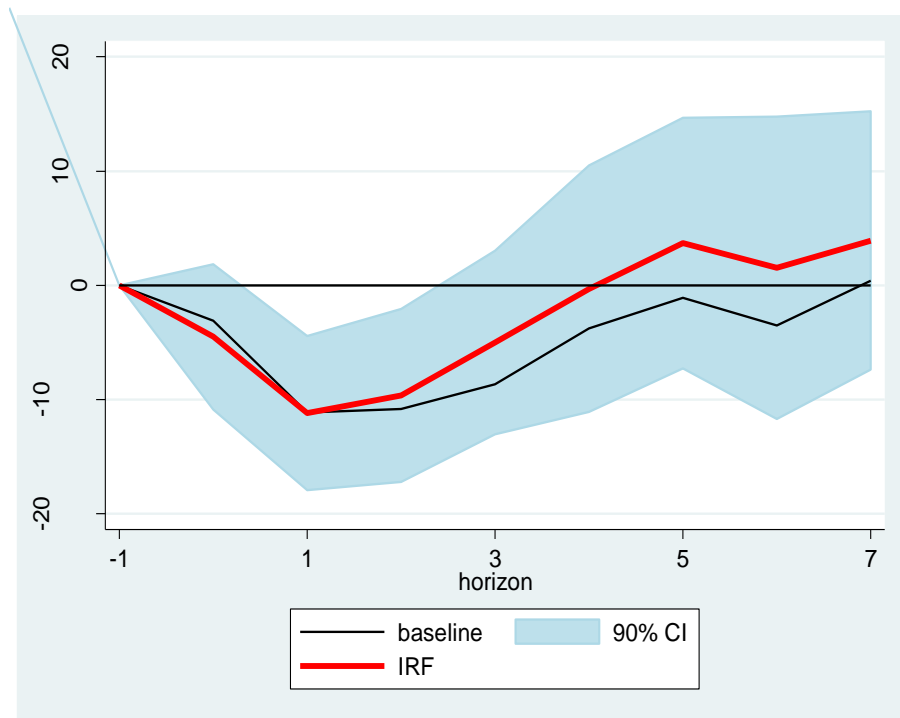


ROBUSTNESS CHECKS II



Effect of a U.S. monetary policy shock on cross-border bank lending controlling for:

global financial risks



liquidity risks

