Credit Supply and Demand in Unconventional Times

Carlo Altavilla

European Central Bank

Miguel Boucinha

European Central Bank

Sarah Holton

European Central Bank

Steven Ongena

U of Zurich, SFI, KU Leuven & CEPR

✓ Do individual bank supply and demand pressures both determine credit origination?

✓ Can loan demand also depend on bank characteristics?

✓ Have non-standard monetary policies impacted loan supply?

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✓ **Can loan demand also depend on bank characteristics?**

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✓ Can loan demand also depend on bank characteristics?

✓ Have non-standard monetary policies impacted loan supply?

➢ **Establishing determinants of credit using bank lending surveys**

    ➢ US: Lown, Morgan, and Rohatgi (EPR 2000), Lown and Morgan (JMCB 2006), Bassett, Chosak, Driscoll, and Zakrajek (JME 2014)

    ➢ European countries: Blaes (2011), Del Giovane, Eramo, Nobili (JBF 2011), Pintarić (2015)
      Euro area: Ciccarelli, Maddaloni, Peydró (EP 2013), Ciccarelli, Maddaloni, Peydró (RED 2015), Altavilla, Darracq Paries and Nicoletti (2015)

➢ **Identifying changes in credit supply from demand**

  ➢ **Macro:** Bernanke and Blinder (AER 1992)

  ➢ **Bank level:** Kashyap and Stein (AER 2000) Kishan and Opiela (JMCB 2000); Greenstone, Mas and Nguyen (2014)

  ➢ **Loan level:** Khwaja and Mian (AER 2008)

  ➢ **Incl. loan applications:** Jiménez, Ongena, Peydró and Saurina (AER 2012, ECMA 2014)

➢ **Identification strategies rely on credit demand being <u>firm-specific</u>**

  ➢ But maybe this requirement is too stringent and demand is homogenous within **<u>location-sector "clusters"</u>**: e.g., Degryse, De Jonghe, Jakovljević, Mulier and Schepens (2017), Auer and Ongena (2017), De Jonghe, Dewachter, Mulier, Ongena and Schepens (2017)

  ➢ Or demand may be **<u>firm-bank-specific</u>** (at times and in places)? Paravisini, Rappoport and Schnabl (2015)

➢ **Effects of non-standard monetary policy measures on credit**

    ➢ E.g., Joyce and Spaltro (2014), Bowman, Cai, Davies and Kamin (JIMF 2015), Altavilla, Canova, Ciccarelli (2016), Rodnyansky and Darmouni (RFS 2017), Temesvary, Ongena and Owen (2018)

✓ Both individual bank supply as well as demand are a significant determinant of credit developments

✓ The strength of the credit supply channel may be time-varying, i.e., stronger over the crisis

❑ both in absolute terms and relative to the importance of credit demand

✓ Bank characteristics affect not only individual bank supply changes but also demand changes

❑ Implying that credit demand may at times be bank-specific

✓ Banks more exposed to non-standard measures increase credit granted

➢ **Data and stylised facts**

➢ Actual credit developments, and BLS supply and demand

➢ Balance sheet strength, credit supply and demand

➢ Interaction with Non-standard monetary policies

➢ Conclusions

Data and Stylised facts

- **Data**

  - **Individual Bank Lending Survey responses (iBLS)**

    - ✓ granular - information on 116 BLS banks from 13 countries
    - ✓ representative - includes over 50% of total loans to enterprise
   - ✓ time-series - quarterly data from 2002Q4-2017Q4

    > **Novelty:** can be linked to individual banks' loan developments and balance sheet characteristics across a number of countries for a decade

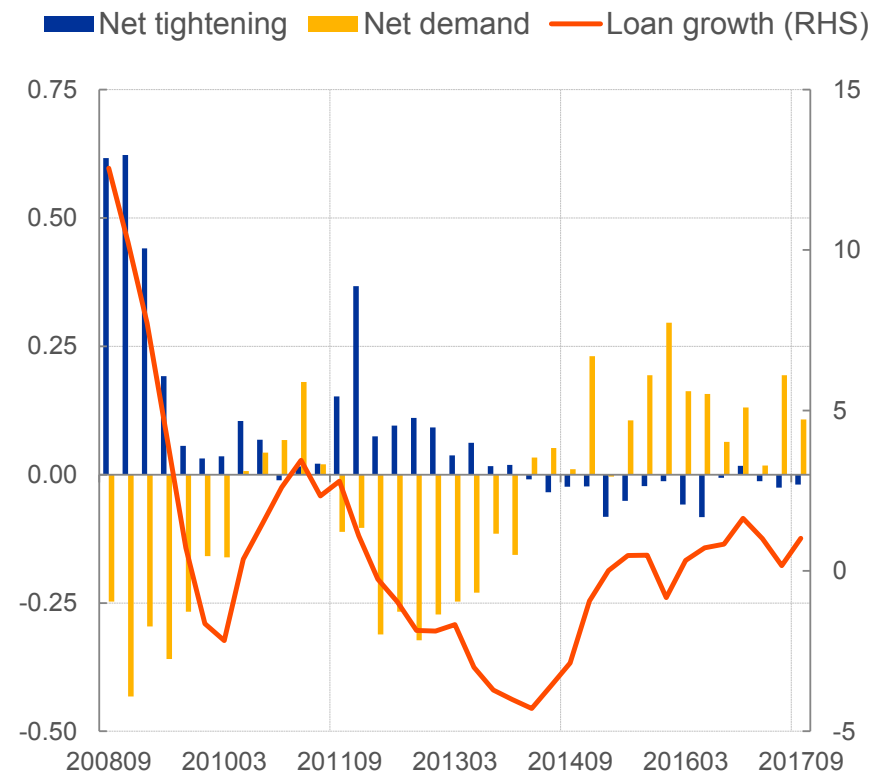 - **Individual Balance sheet information (iBSI)**

    - ✓ Monetary financial institutions (MFIs) – 134 linked to the BLS banks
    - ✓ Data from mid-2007
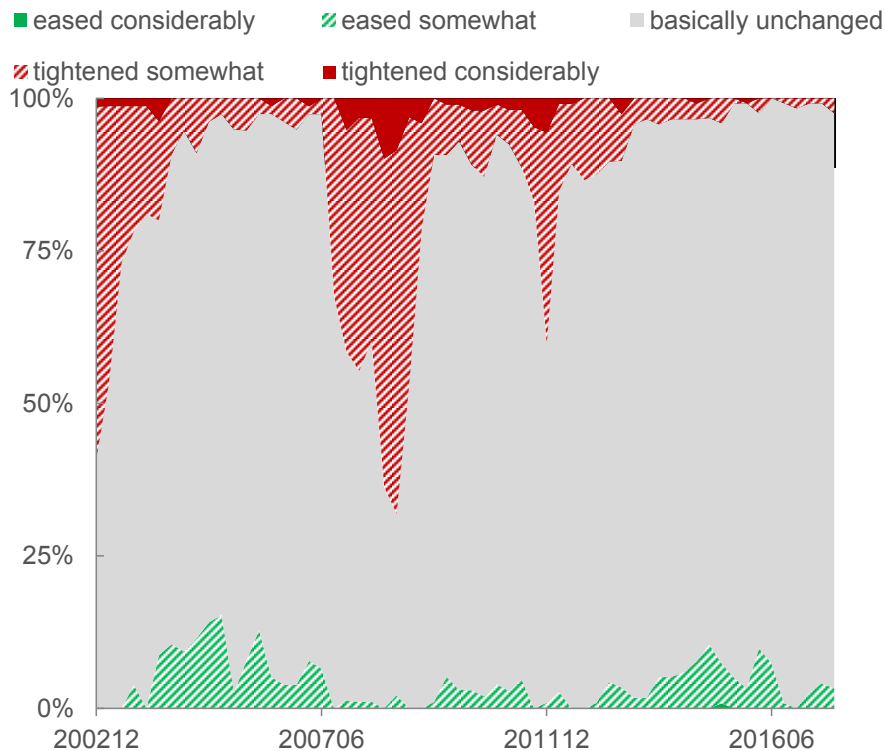
  - **Financial market data**
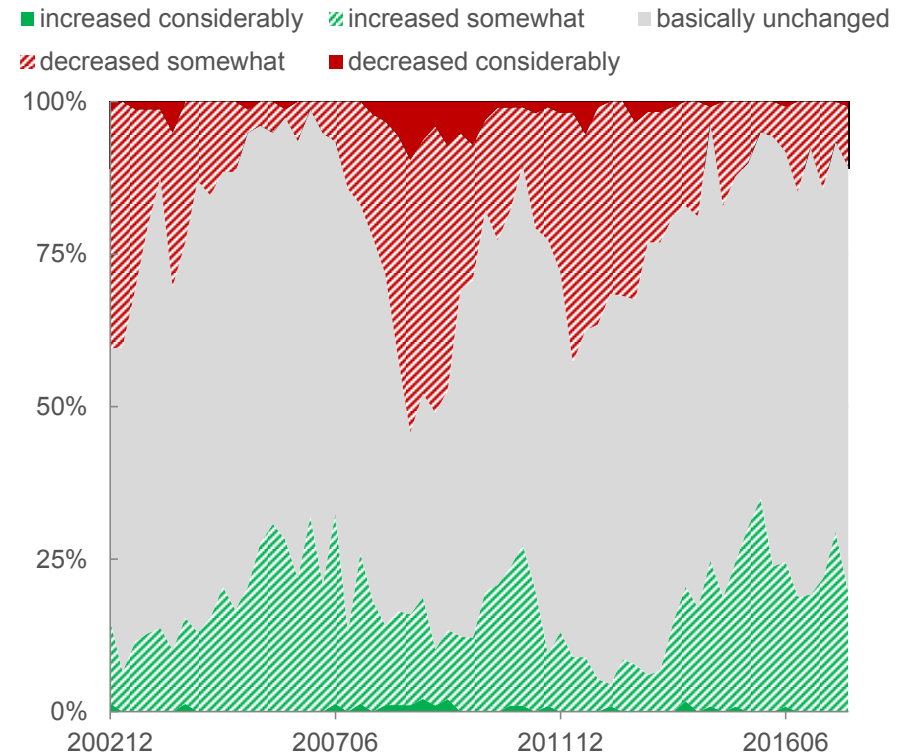
Loans to euro area NFCs
(annual growth rates)
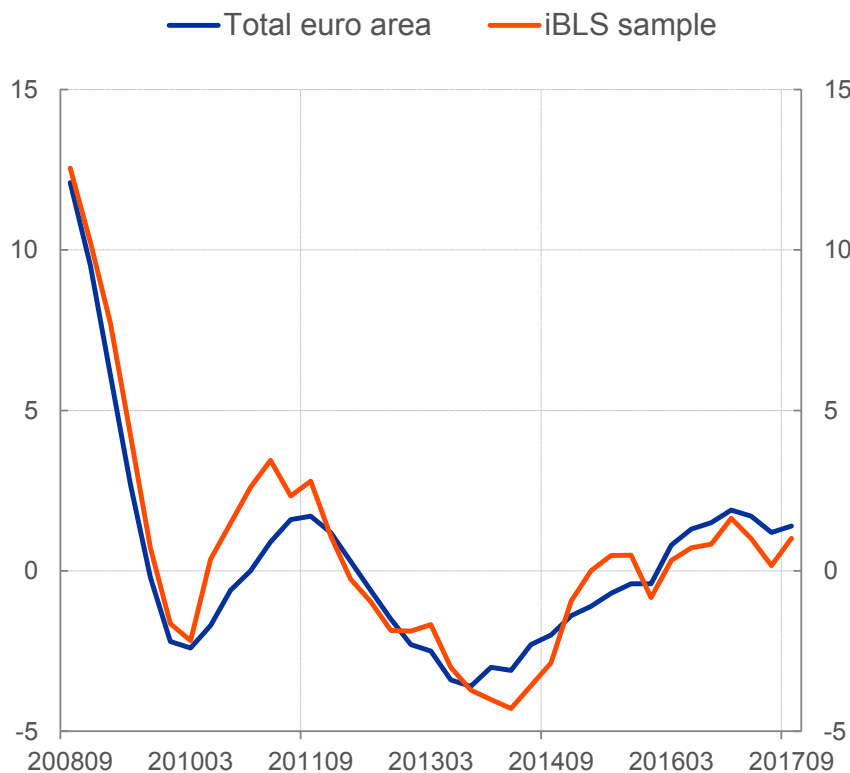
Loans to NFCs, credit standards and demand
(net percentages, annual growth rates)

Credit supply
(percentage of bank responses)

Credit demand
(percentage of bank responses)

Legend (left chart):
- eased considerably
- eased somewhat
- basically unchanged
- tightened somewhat
- tightened considerably

Legend (right chart):
- increased considerably
- increased somewhat
- basically unchanged
- decreased somewhat
- decreased considerably

Notes: iBLS bank responses, ESCB

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Credit conditions across regions

— net tightening   — net demand

Euro area   UK   US
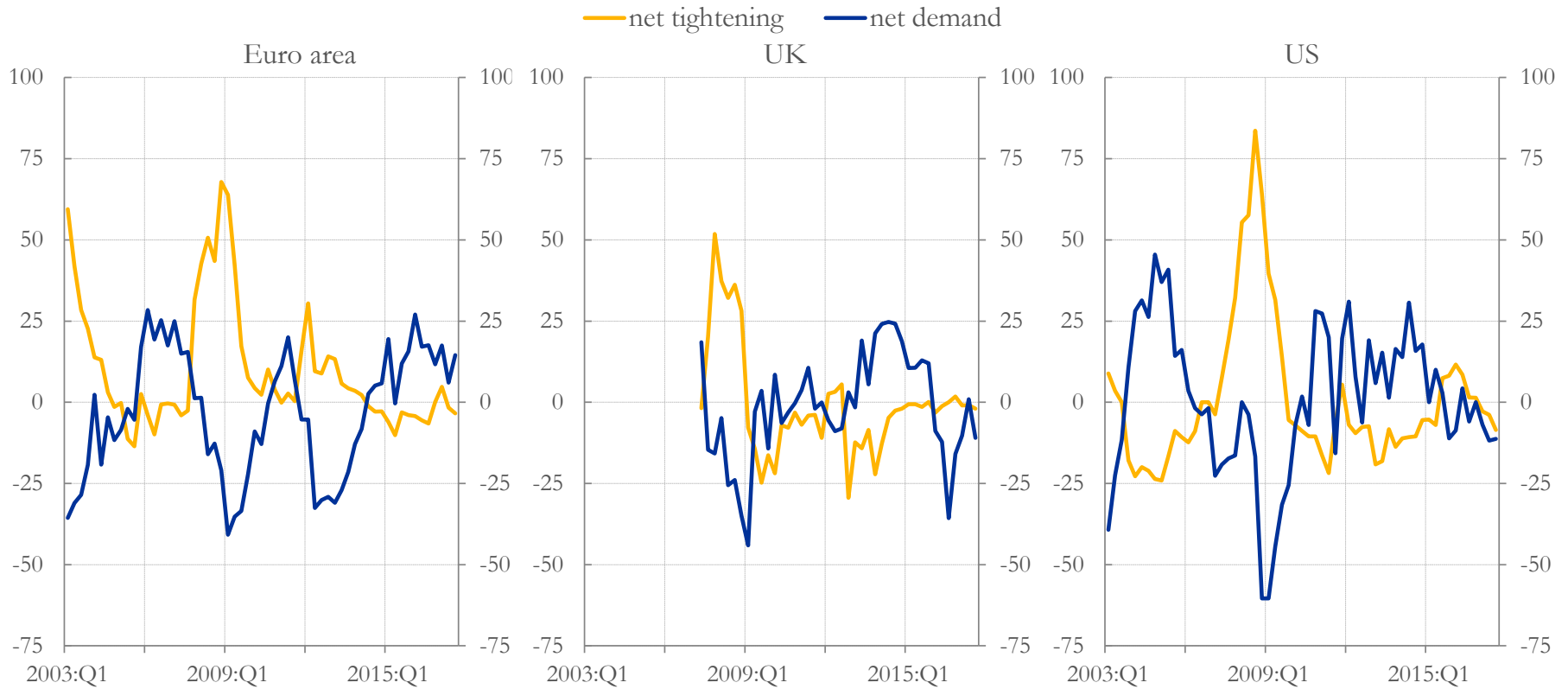
Notes: Source: Eurosystem BLS, Bank of England Credit Conditions Survey, Federal Reserve System Senior Loan Officer Opinion Survey on Bank Lending Practices

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➢ **Stylised facts**

➢ **Credit developments, BLS supply and demand**

➢ **Balance sheet strength, credit supply and demand**

➢ **Interaction with Non-standard monetary policies**

➢ **Conclusions**

✓ Do individual bank supply and demand pressures both determine credit origination?

$$\Delta Credit_{b,c,t} =$$

$$\alpha_b + \delta_{c,t} + \sum_{n=1}^{4} \beta_n \Delta Credit_{b,c,t-n} +$$

$$\gamma_1 \Delta Credit\ Supply_{b,c,t} + \gamma_2 \Delta Credit\ Demand_{b,c,t} + \epsilon_{b,c,t}$$

$\Delta Credit_{b,c,t}$ = *quarter on quarter loan growth to non-financial corporations*

$\Delta Credit\ Supply_{b,c,t}$, $\Delta Credit\ Demand_{b,c,t}$ = *iBLS*
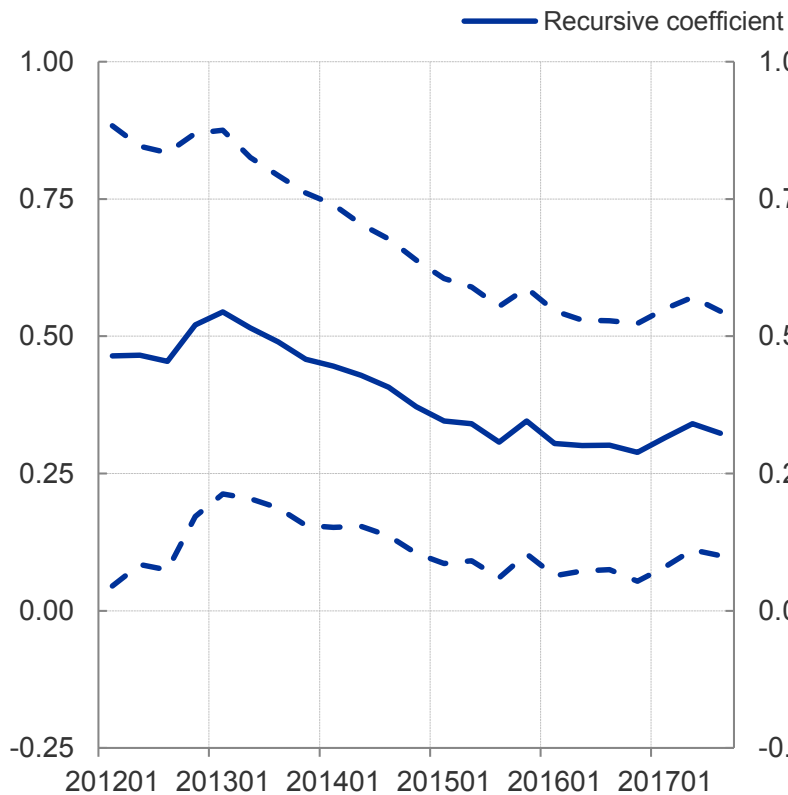
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Credit developments, BLS supply and demand

$$\Delta Credit_{b,c,t} = \alpha_b + \delta_{c,t} + \sum_{n=1}^{4} \beta_n \Delta Credit_{b,c,t-n} + \gamma_1 \Delta Credit\ Supply_{b,c,t} + \gamma_2 \Delta Credit\ Demand_{b,c,t} + \epsilon_{b,c,t}$$
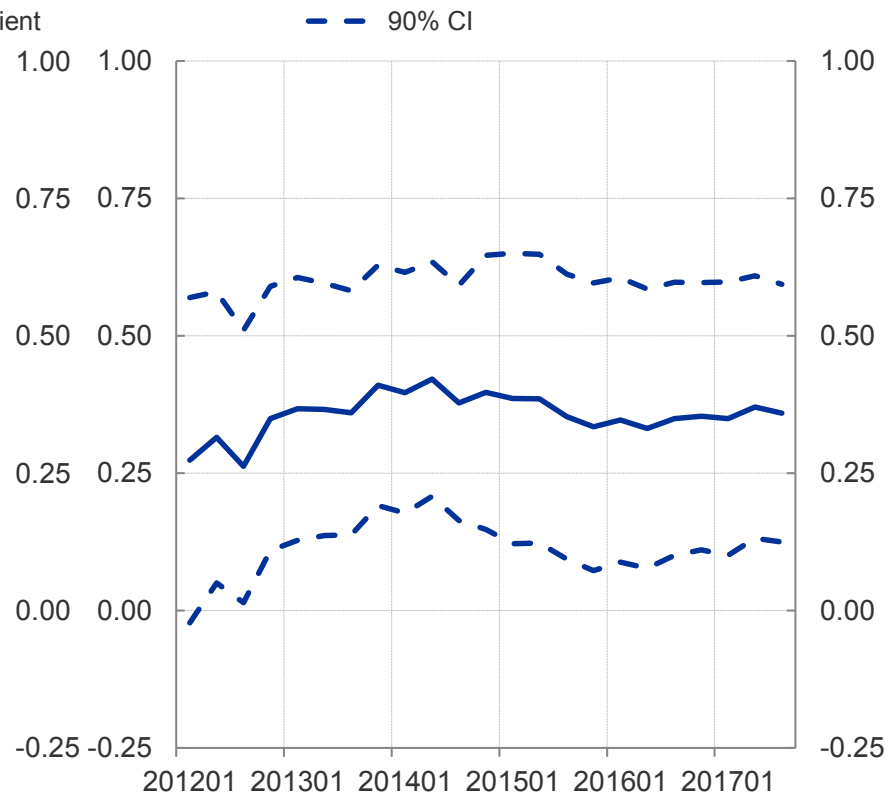
Dependent variable	$\Delta\text{Credit}_{b,c,t}$	$\Delta\text{Credit}_{b,c,t}$	$\Delta\text{Credit}_{b,c,t}$
ΔCredit supply$_{b,c,t}$	0.560***	0.297***	0.343**
ΔCredit demand$_{b,c,t}$	0.461***	0.451***	0.364***
Bank fixed effects	No	Yes	Yes
Country-time fixed effects	No	No	Yes
Number of observations	3308	3308	3308
Number of banks	107	107	107
R^2	0.153	0.201	0.360

Notes: The model includes 4 lags of the dependent variable (not shown). The dependent variable is the quarterly bank level growth rate of loans to non-financial corporations during the period 2007Q3-2017Q4. Coefficients and the corresponding significance levels are indicated with stars. "Yes" indicates that the set of characteristics or fixed effects is included. "No" indicates that the set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

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Credit supply

Credit demand

Notes: The figure displays the recursive estimates of the coefficients (and the corresponding 90% confidence intervals) of a regression of the bank-level quarterly growth rate of NFC loans on loan supply and demand as reported by banks in the BLS for windows starting in 2007Q3 and ending in the year and quarter indicated on the x-axis (column 3 in the previous slide).

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➢ **Stylised facts**

➢ **Actual credit developments, and BLS supply and demand**

➢ **Balance sheet strength, credit supply and demand**

➢ **Interaction with Non-standard monetary policies**

➢ **Conclusions**

Can loan demand also depend on bank characteristics?

$$\Delta BLS_{b,c,t} = \alpha_b + \delta_{c,t} + \sum_{n=1}^{4} \beta_n \Delta BLS_{b,c,t-n} + \omega\,Shock_t + \psi\,X_{b,c,t-1} + \phi(Shock_t \times X_{b,c,t-1})$$
$$+ \theta Borrower\ risk_{b,c,t} + \epsilon_{b,c,t}$$

BLS = credit Supply (CS), credit Demand (CD)

Shock = change in 3-month Euribor

$X_{b,c,t-1}$*= bank specific measure of risk (CDS)*
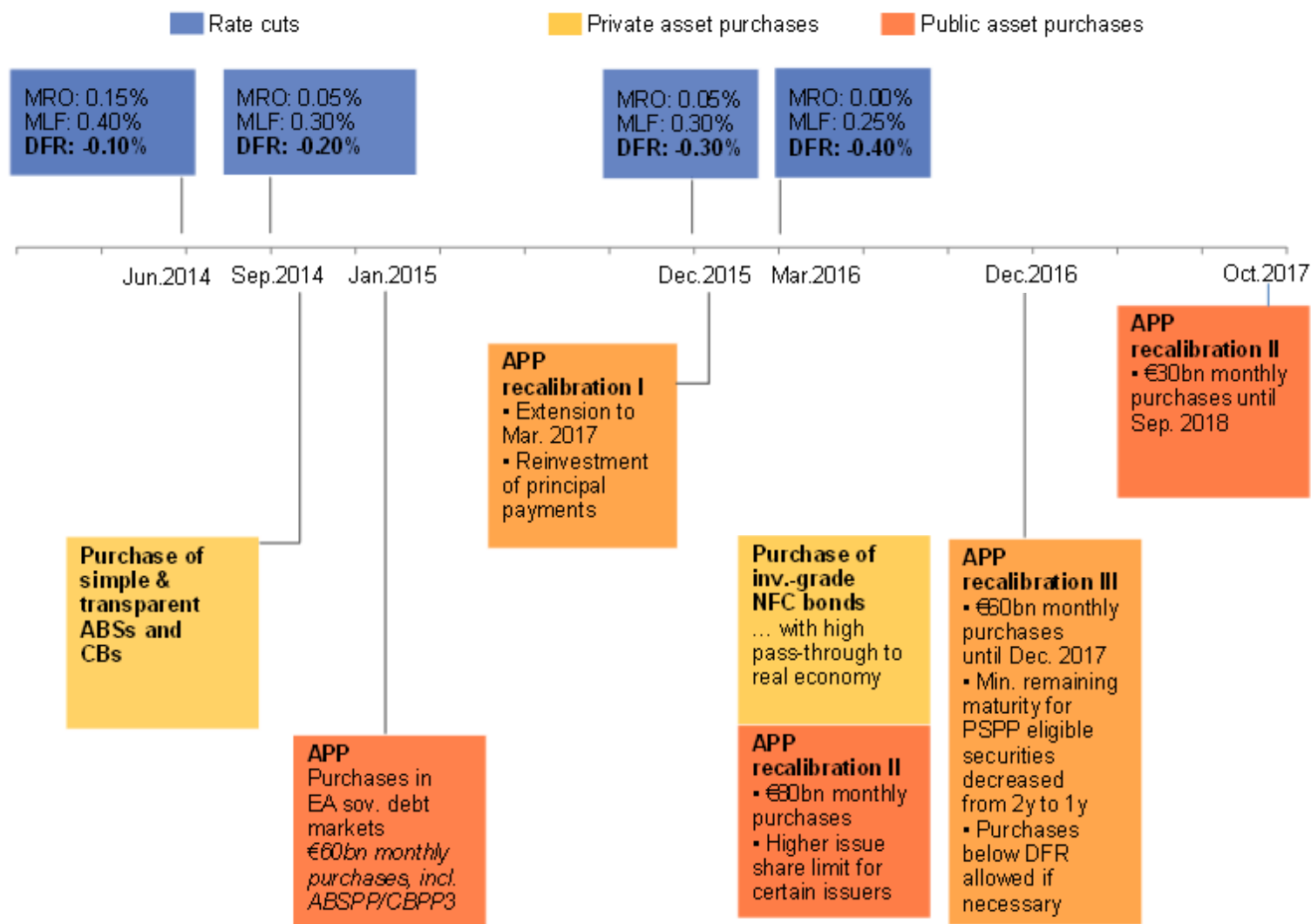
Balance sheet strength, credit demand and supply

$$\Delta BLS_{b,c,t} = \alpha_b + \delta_{c,t} + \sum_{n=1}^{4} \beta_n \Delta BLS_{b,c,t-n} + \omega \, Shock_t + \psi \, X_{b,c,t-1} + \phi \, (Shock_t \times X_{b,c,t-1}) + \theta Borrower \, risk_{b,c,t} + \epsilon_{b,c,t}$$

Dependent variable:	ΔCredit supply$_{b,c,t}$		ΔCredit demand$_{b,c,t}$	
Δ CDS$_{b,c,t-1}$	-0.000525**	-0.000473***	-0.000741***	-0.000717***
ΔEuribor$_t$ x Δ CDS$_{b,c,t-1}$	-0.000868*	-0.000764**	-0.00135***	-0.00130**
Borrower risk$_{b,c,t-1}$		-0.331***		-0.199***
Bank fixed effects	Yes	Yes	Yes	Yes
Country-time fixed effects	Yes	Yes	Yes	Yes
Number of observations	2662	2659	2642	2639
Number of banks	90	90	90	90
R^2	0.553	0.616	0.499	0.509

Notes: The dependent variables are the bank reported changes in Credit supply and Credit demand during the period 2007Q2-2017Q4. Coefficients and the corresponding significance levels are indicated with stars. *** Significant at 1%, ** significant at 5%, * significant at 10%.

➢ **Stylised facts**

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➢ **Conclusions**

Legend: Rate cuts | Private asset purchases | Public asset purchases

Rate cuts:
- MRO: 0.15% / MLF: 0.40% / **DFR: -0.10%**
- MRO: 0.05% / MLF: 0.30% / **DFR: -0.20%**
- MRO: 0.05% / MLF: 0.30% / **DFR: -0.30%**
- MRO: 0.00% / MLF: 0.25% / **DFR: -0.40%**

Timeline: Jun.2014 — Sep.2014 — Jan.2015 — Dec.2015 — Mar.2016 — Dec.2016 — Oct.2017

Purchase of simple & transparent ABSs and CBs

APP Purchases in EA sov. debt markets €60bn monthly purchases, incl. ABSPP/CBPP3

APP recalibration I
- Extension to Mar. 2017
- Reinvestment of principal payments

Purchase of inv.-grade NFC bonds … with high pass-through to real economy

APP recalibration II
- €80bn monthly purchases
- Higher issue share limit for certain issuers

APP recalibration III
- €60bn monthly purchases until Dec. 2017
- Min. remaining maturity for PSPP eligible securities decreased from 2y to 1y
- Purchases below DFR allowed if necessary

APP recalibration II
- €30bn monthly purchases until Sep. 2018

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✓ **Have non-standard monetary policies impacted loan supply?**

Difference in loan growth between treated and untreated banks
(quarterly growth rates)
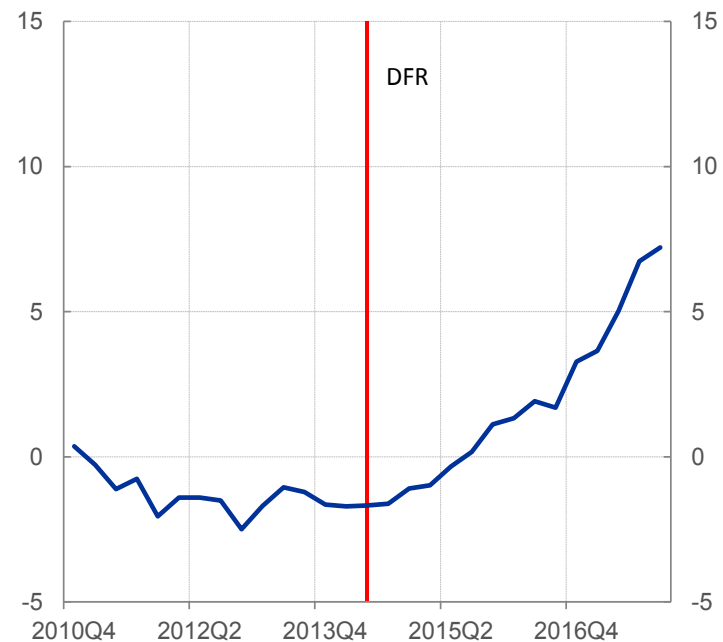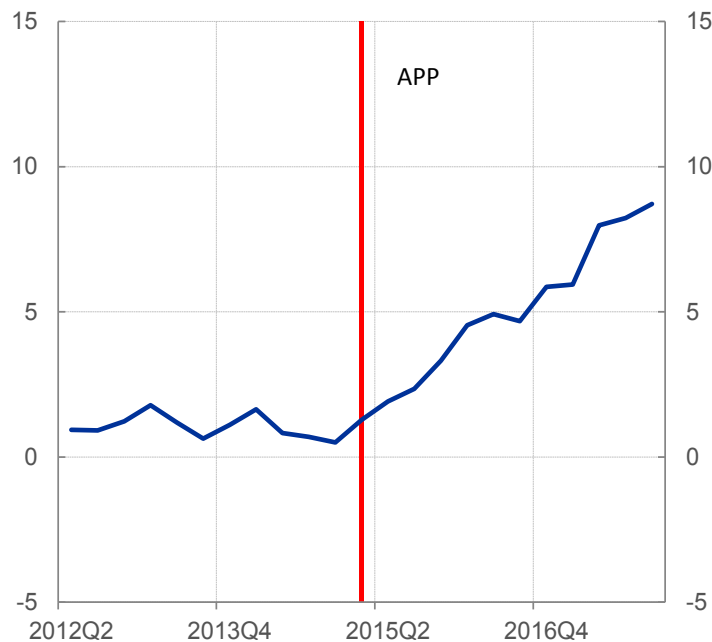
Notes: The figures display the cumulated differences in quarterly growth rates between banks in the treatment and control groups for the APP (LHS) and DFR (RHS). For the APP, treated banks are those who on average reported that the APP impact on their liquidity position was more positive. For the DFR, treated banks are those who on average reported that the impact of the negative interest rate policy on their net interest margin was stronger.

Non-standard monetary policies

✓ Have non-standard monetary policies impacted loan supply?

$\Delta Credit_{b,c,t}$

$$= \sum_{n=1}^{4} \gamma_n \Delta Credit_{b,c,t-n} + \beta_1(Treated_{b,c} * Post_t)$$

$$+ \beta_2 Post_t + \beta_3 Treated_{b,c} + \beta_4 \Delta Demand_{b,c,t} + \beta_5 \text{Borrower risk}_{b,c,t} + \Gamma X_{b,c,t-1}$$

$$+ \alpha_b + \delta_{c,t} + \epsilon_{b,c,t}$$

Treated= 0, 1 for banks more affected by each policy: Asset purchase programme (APP) and negative deposit facility rate (DFR)

T = 0, 1 from Jan 2015 for APP and 1 from June 2014 for negative DFR

X = Bank characteristics (size, leverage, liquidity)

Non-standard monetary policies

Policy measure:	APP			DFR		
$(\text{Treated}_{b,c,t}) \times (\text{Post}_t)$	0.563**	0.706**	0.502*	0.508**	0.530*	0.810***
Post_t	0.336*	0.426**		0.0794	0.136	
$\text{Treated}_{b,c,t}$	-0.130			-0.144		
$\Delta\, \text{Demand}_{b,c,t}$	0.355***	0.333***	0.324**	0.395***	0.395***	0.355***
$\text{Borrower risk}_{b,c,t-1}$	-0.290***	-0.129	-0.186	-0.286***	-0.121	-0.163
$\text{Leverage}_{b,c,t-1}$	-4.590***	-6.358**	-0.367	-4.469***	-5.844**	0.260
$\text{Size}_{b,c,t-1}$	-0.105**	-1.163***	-1.145***	-0.103**	-1.125***	-1.327***
$\text{Liquidity}_{b,c,t-1}$	-0.570	1.466	2.543*	-0.578	1.555	2.660*
Bank fixed effects	No	Yes	Yes	No	Yes	Yes
Country-time fixed effects	No	No	Yes	No	No	Yes
Number of observations	3196	3196	3196	3304	3304	3304
Number of banks	103	103	103	106	106	106
R^2	0.165	0.214	0.367	0.165	0.210	0.368

Notes: For the APP, treated banks are those who on average reported that the APP impact on their liquidity position was more positive. For the DFR, treated banks are those who on average reported that the impact of the negative interest rate policy on their net interest margin was stronger. The dependent variable is the quarterly growth rate of loans to the non-financial private sector during the period 2007Q3-2017Q4. The model includes 4 lags of the dependent variable (not shown). *** Significant at 1%, ** significant at 5%, * significant at 10%.

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➢ **Main messages**

  ➢ Results show that both the APP and the negative DFR led to an increase in the supply of bank loans even after controlling for

  - ✓ all macroeconomic effects
  - ✓ loan demand
  - ✓ borrower risk
  - ✓ bank characteristics
  - ✓ all other observable and unobservable differences across banks that are time invariant

  ➢ Increased loan demand is associated with higher loan growth even when bank and country-time fixed effects are included, indicating that loan demand

  - ✓ is time-variant
  - ✓ varies across banks even within a certain country and time-period.

➢ **Stylised facts**

➢ **Actual credit developments, and BLS supply and demand**

➢ **Balance sheet strength, credit supply and demand**

➢ **Interaction with Non-standard monetary policies**

➢ **Conclusions**

Conclusions

✓ Do individual bank supply and demand pressures both determine credit origination?

➢ YES: with evidence that supply is more relevant over crisis periods

✓ Can loan demand also depend on bank characteristics?

➢ YES: implying bank riskiness could be relevant for the borrower selection of external financing sources

✓ Have non-standard monetary policies impacted loan supply?

➢ YES: APP and DFR supported bank lending