Credit Supply and Demand in Unconventional Times

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12-13 November, 2018

Annual DNB Research Conference, Amsterdam

Background

IDENTIFICATION of impact of monetary policy shocks on banks' credit SUPPLY: How to control for credit demand?

- Bernanke and Blinder (1992)
  - ▶ Monetary contraction is followed by fall in **aggregate** lending
- Kashyap and Stein (2000)
  - ▶ Use **bank level** lending volumes to show that impact of monetary policy depends on bank characteristics: capitalization and asset liquidity
- Khwaja and Mian (2008)
  - ▶ Use **bank-firm level** credit exposure data to control for firm-specific credit demand (firm-time fixed effects)
- **This paper**
  - ▶ Uses **survey-based measure** to control for firms' bank specific credit demand: credit demand depends on bank characteristics

Goal of This Paper

Assess impact of monetary shocks on banks' credit SUPPLY, CONTROLLING for firms' bank-specific DEMAND

1) Show that both credit demand and credit supply affect bank-level lending growth

2) Show that **banks' balance-sheet strength** matters for both credit demand and credit supply

3) Assess impact of **ECB's unconventional monetary policy measures** on banks' credit supply
   - Introduction of **negative interest rates (DFR)** on reserves in excess of minimum reserve requirement, in June 2014
   - Expanded **Asset Purchase Programme (APP)** announced in January 2015

Novelty of Paper

Survey-based measures of banks' corporate credit supply and demand: ECB's Bank Lending Survey (BLS)

- **Credit Supply**
    - ▸ "Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to enterprises changed?"
        - 1 - Tightened considerably .... 5 - Eased considerably
- **Credit Demand**
    - ▸ "Over the past three months, how has the demand for loans or credit lines to enterprises changed at your bank, apart from normal seasonal fluctuations?"
        - 1 - Decreased considerably .... 5 - Increased considerably

Empirical Approach 1

Specification to identify effects of interest rate changes on credit supply and demand

- Estimate **effect of interest rate change** in quarter *t-1* on
    - change in **credit supply** $\Delta Supply_{b,c,t}$
    - change in **credit demand** $\Delta Demand_{b,c,t}$

    for bank *b* in country *c* in quarter *t*
- Differentiate effect by **bank balance-sheet strength**
    - Change in bank's CDS spread, non-performing loan ratio, capital ratio, domestic sovereign holdings
- Use of **bank** and **country-time** fixed effects

$$
\begin{aligned}
\Delta Y_{b,c,t} &= \alpha_b + \delta_{c,t} + \beta_1 \Delta Euribor_{t-1} + \beta_2 \Delta Euribor_{t-1} * Bank\ strength_{b,c,t-1} \\
&+ \beta_3 Bank\ strength_{b,c,t-1} + \beta_4 Borr.risk_{b,c,t} + \sum_{n=1}^{4} \gamma_n \Delta Y_{b,c,t-n} + \epsilon_{b,c,t}
\end{aligned}
$$

Empirical Approach 2

Diff-in-diff estimation to identify effect of DFR and APP on credit supply, controlling for demand

- Estimate effect of **treatment (DFR or APP)** in quarter t on
  - change in **corporate lending** $\Delta Loans_{b,c,t}$

  for bank b in country c
- Explicitly control for **bank-level credit demand**
  - BLS measure
- Use of **bank** and **country-time** fixed effects

$$
\begin{aligned}
\Delta Loans_{b,c,t} &= \alpha_b + \delta_{c,t} + \beta_1 Post_t + \beta_2 Post_t * Treated_{b,c} + \beta_3 Borr.risk_{b,c,t} \\
&+ \beta_4 Credit\ demand_{b,c,t} + \sum_{n=1}^{4} \gamma_n \Delta Loans_{b,c,t-n} + \epsilon_{b,c,t}
\end{aligned}
$$

Key Findings

Role of credit demand

- Bank level lending growth depends on both **credit supply** and **demand** (proxied by BLS measures)
- Monetary policy changes affect both credit supply and demand **more** at **banks with higher CDS spread**
  - ▸ Similar results when interacting monetary policy variable with other balance-sheet characteristics (NPL, capital ratio, exposure to domestic sovereign bonds)

Impact of unconventional policy measures (DFR, APP)

- Banks reporting **larger impact from negative DFR and APP** policy measures (treated) show **higher loan growth**
  - ▸ Loan supply increased particularly at banks affected by both

Assessment

Overall assessment

- Clearly written paper, focusing on well defined question(s)
- Novel use of BLS survey data to justify role of credit demand
- Important results on impact of unconventional policy measures

Major comments

Empirical specification: Dynamic panel model

- Provide some justification for dynamic panel specification
  - ▶ Figure 3 shows loan growth, measures of supply and demand are persistent
  - ▶ What are the time series properties of these variables?
    - Average 1-4 order autocorrelations of $\Delta Loans_{b,c,t}$?
  - ▶ Short discussion on why to include 4 lags of the dependent variables

- Potentially consider modelling volume of lending $Log(Lending_{b,c,t})$ as dependent variable
  - ▶ Esp. in diff-in-diff specifications (Tables 5, 6)

Major comments cont'd

Empirical specification: Dynamic models with fixed effects

- When including lagged dependent variables, fixed effect specification may result in biased estimates when T is small

$$Y_{bt} = \alpha_b + \beta X_{bt} + \gamma Y_{b,t-1} + \epsilon_{bt}$$

  - The fixed effect (within) estimation:

  $$Y_{bt} - \bar{Y}_b = \beta \left(X_{bt} - \bar{X}_b \right) + \gamma \left(Y_{b,t-1} - \bar{Y}_b \right) + \epsilon_{bt}$$

  - then $\left(Y_{b,t-1} - \bar{Y}_b \right)$ is correlated with ϵ_{bt}

- Potentially consider dynamic panel methodology (Table 3)
  - Anderson and Hsiao (1981) instrumental variable approach
  - GMM estimation

Major comments cont'd

Empirical specification: Bank characteristics

- Measures of bank balance-sheet strength defined as changes rather than levels in regressions. Discussion of results is about levels:

  - "... increase in Euribor will decrease both credit supply and demand more at banks with higher CDS spreads"

- In literature, most papers use levels (or dummies based on levels) of bank characteristics

$$
\begin{aligned}
\Delta Y_{b,c,t} = {} & \alpha_b + \delta_{c,t} + \beta_1 \Delta Euribor_{t-1} + \beta_2 \Delta Euribor_{t-1} * Bank\ strength_{b,c,t-1} \\
& + \beta_3 Bank\ strength_{b,c,t-1} + \beta_4 Borr.risk_{b,c,t} + \sum_{n=1}^{4} \gamma_n \Delta Y_{b,c,t-n} + \epsilon_{b,c,t}
\end{aligned}
$$

- Include time-varying bank variables when estimating credit demand and supply equations (Tables 3, 4)

  - bank total assets, profitability, capitalization

Other comments

Empirical specification: Diff-in-diff regressions

- Additional **time-varying bank variables** that influence loan growth when estimating diff-in-diff equations (Table 5)

  - ▶ Bank profitability, non-performing loans

- Classification of **treatment** and **control** groups is based on survey measures of the impact of policies (DFR, APP)

  - ▶ Other definitions of treatment based on bank balance-sheet variables?