Monetary Policy and Risk Taking

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Relevance of risk taking channel

- Risk taking channel: low interest rate fuel risk (as banks take up more leverage and finance more risky projects) which is contractionary in the medium run
- This channel is absent in traditional models of monetary transmission mechanism, but played an important role in the 2007-2008 crisis
- Importance of risk taking channel, mostly relatively to balance sheet channel (the latter requiring expansionary policies)
- In this paper: examine relevance of risk taking channel in data and model (in Angeloni and Faia 2009 analysis of optimal monetary and capital regulation policy)
Data and model based analysis

- Survey/panel evidence on risk taking channel: Maddaloni and Peydró Alcalde 2010, Altunbas et al. 2010. We provide macro/VAR evidence
- Model based analysis: includes banks and firms’ balance sheet channel (through financial accelerator) and risk taking channel (as from Angeloni and Faia 2009)
- Results:
  1. Data show that lowering interest rates increases risks (measured in various ways)
  2. Model (results compared to BGG 1998 financial accelerator and AF 2009): confirm lowering interest rates increases risk in medium run (banks’ risk premia turn from countercyclical to pro-cyclical) and is contractionary on output (Bloom 2009)
Relation to the literature

- Angeloni and Faia 2009 introduce risk taking channel (through optimizing banks) into macro model
Data analysis: measuring risk

- Funding risk (ratio of total bank assets to deposits), riskiness of the asset mix (incidence of household credit on the asset side) and option-based stock market volatility index
- US and EA: causality from monetary policy to risk, not the opposite
- VAR: effect of monetary policy on risk and risk on the business cycle (Bloom 2009)
- Ordering (also tested different ordering): assumption that all shocks instantaneously influence the stock market and the interest rate
Notes: for the calculation of impulse responses we use the same estimation order of the variables as in Bloom et al. (2010), with the difference that we insert the bank asset risk and funding risk variables between the macro and the financial block. Therefore, the variables in the estimation order are industrial production, employment, inflation, asset risk, funding risk, monetary policy rate, the stock market volatility indicator and the stock market index. The ordering used here is based on the assumption that shocks instantaneously influence the stock market (levels and volatility), then the interest rate. Subsequently bank balance sheet variables adjusts, followed by macro adjustments (first the price index and then quantities). As it is not clear which bank risk proxy variable should be placed first, we estimate different VAR models inverting the order of these two variables. The results are not affected. For the US, the model is estimated with monthly data from January 1974 to June 2008. For the euro area the sample covers the period March 1991 to December 2008.
Chart 2: Impulse Responses to an uncertainty shock (macro variables)

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<th>US inflation</th>
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Notes: see notes to chart 1.
Notes: The impulse response of funding risk to a monetary policy shock for the euro area was estimated over the period January 2000 – December 2008, as it was only possible to compute the funding risk index after January 2000. The impact of monetary policy on uncertainty is estimated using the volatility index calculated by Bloom (2010) for the US and an equivalent volatility index for the euro area. See also notes to chart 1.
The Model

- Banks: funding department (AF 2009) and lending department (BGG 1998)
- DSGE with capital and idiosyncratic risk: risk on banks’ returns on assets and risks’ on banks’ lending
The model: standard households and producers

1. Households: \( E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t) \)

2. Monopolistic firms, Rotemberg adjustment costs: \( \frac{\vartheta}{2} \left( \frac{P_t(i)}{P_{t-1}(i)} - \pi \right)^2 \).

   Standard Phillips curve

3. Capital producers: \( K_{t+1} = (1 - \delta)K_t + \phi(\frac{l_t}{K_t})K_t \)

4. Asset price and return on capital:
   \[
   Q_t \phi'(l_{t+1}) = P_t; \quad \frac{R_{K,t+1}}{\pi_{t+1}} = \frac{Z_{t+1} + Q_{t+1}(1-\delta) - \phi'(\frac{l_{t+1}}{K_{t+1}})l_{t+1}}{Q_t} + \phi(\frac{l_{t+1}}{K_{t+1}})
   \]

5. Taylor rule, passive fiscal side

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Monetary Policy and Risk Taking
Bank is relationship lender with expertise in early liquidation. Liquidation value without the bank is $\lambda$ (between 0 and 1).

Project return $R_{A,t} + x$, where $x$ follows a uniform distribution over $[-h; h]$.

Time 0: capital structure; project undertaken. Time 1: project outcome; run or no run; payoffs; new project.

Three cases:

1. the outcome of the project is too low to pay depositors
2. the project outcome is high enough to pay depositors only if the project’s value is extracted by the bank
3. the project’s outcome is high enough to pay depositors
Optimal bank capital

- Return to outside investors:

\[
\frac{1}{2h} \int_{-h}^{h} \frac{(1+\lambda)(1-c)(R_t^A + x_t)}{2} dx_{j,t} + \frac{R_t d_t - R_t A}{\lambda} - R_t A \\
\frac{1}{2h} \int_{-h}^{h} \frac{(1+\lambda)(R_t^A + x_t)}{2} dx_{j,t} + \frac{R_t d_t - R_t A}{\lambda} - R_t A \\
\frac{1}{2h} \int_{-h}^{h} \frac{(1+\lambda)(R_t^A + x_t)}{2} dx_{j,t} + R_t d_t - R_t A
\]

- Optimal bank capital (max. expected payoff to outside investors)

\[
d_t = \frac{1}{R_t} \frac{R_t^A + h}{2 - \lambda + c(1 + \lambda)}
\]
Accumulation of bank capital and bank riskiness

Accumulation of bank capital:

\[
BK_{t+1} = \theta [BK_t + \frac{(R^A_{t+1} + h - R_{t+1}d_{t+1})^2}{8h} (1 - \xi)(Q_{t-1}K_t - NW_t)]
\]

Bank riskiness (probability of run):

\[
Br_t = \frac{1}{2h} \int_{-h}^{R_t-R^A_t} dx_{j,t} = \frac{1}{2} \left( 1 - \frac{R^A_t - R_t d_t}{h} \right)
\]
Banks: lending department

- Returns to investment: \( \omega_{t+1} R^K_{t+1} Q_t K_{t+1} \), where \( R^K_{t+1} \), where \( \omega_{t+1} \) idiosyncratic uncertainty

- Financing amount \( EF_{t+1} = Q_t K_{t+1} - NW_{t+1} \), \( NW_{t+1} \) is the entrepreneur´s net worth, \( EF_{t+1} \) includes a fixed proportion \( 1 - \zeta \) of own bank funds, \( L_{t+1} \), while the rest is raised by issuing corporate bonds

- Costly state verification debt contract which leads to the following EFP (as function of firms’ leverage):

\[
\rho(\omega_{t+1}) = \frac{R^K_{t+1}}{[(1 - \zeta) R^A_t + \zeta R_t]} = h(\omega_{t+1}) \left(1 - \frac{NW_{t+1}}{Q_t K_{t+1}}\right)
\]
Balance sheet versus risk taking

- Balance sheet channel: *countercyclical EFP*, when $Q_t$ (as induced for instance by fall in $R_t$) raises *EFP declines*
- Risk taking channel: from deposit ratio a fall in $R_t$ raises $d_t$ and $B_{rt}$
- Banks’ lending premium (BLP):

\[
\frac{R_t^A}{R_t} = d_t[2 - \lambda + c(1 + \lambda)] - \frac{h}{R_t} = \alpha d_t - \frac{h}{R_t}
\]

generally *pro-cyclical* (in the medium run)
Conclusions

- Risk taking channel is an important part of the monetary transmission mechanism.
- Absent proper capital regulation this calls for considering the collective externalities originated from monetary policy on banks and financial stability.
- Over-expansionary monetary policies fuel risk (crisis prevention). But also, following a crisis, monetary policy has to balance the benefits from easing liquidity with the medium to long run costs of fueling risk.