ECON8862: Monetary Theory II, Fabio Schiantarelli

Lecture 7: The Bank Lending Channel and the Transmission of Monetary Policy

by Fabio Schiantarelli and Marco Brianti

Fall 2020, Boston College

Introduction

There are two approaches in recent work on the transmission mechanism of monetary policy in the context of capital market imperfections.

1. *Balance Sheet/Financial Accelerator/Broad Credit View*

   There is a wedge between the cost of internal and external finance. Wedge (premium) depends upon net worth. A monetary shock can alter net worth, and hence the premium on external finance. This effect may magnify the impact of monetary policy shocks. This is what we have looked at so far.

2. *Bank Lending Channel/Narrow Credit View*

   Owing to reserve requirements or capital requirements on banks, monetary policy affects availability and cost of bank loans. If there is a group of firms that is dependent upon bank finance, their spending will be affected. This effect goes beyond the standard effect of monetary policy on investment through its effect on the interest rate on bonds.

Basic assumptions of lending channel

1. Effect of tight money cannot be mitigated by managing liability side of bank's balance sheet; e.g. issuing more Certificates of Deposits (CDs).
2. Bank loans and bonds are imperfect substitutes from the point of view of banks.
3. Bank loans and bonds are imperfect substitutes from the point of view of borrowers.
4. Underlying all, there is some degree of price stickiness, so that changes in nominal money affect real money and real credit.

Note: Nothing hinges or requires credit rationing. A reduced quantity of credit may raise the bank loan rate relative to open market lending rates.

Formulation and criticism of the bank lending view

- Bernanke and Blinder (1988)

  Add bank loans to menu of assets of standard IS–LM model.

- *Criticism:* Romer and Romer (1990)

  Banks can issue CDs (on which there are smaller or even none reserve requirements) and compensate monetary tightening.

- *Counter-argument:* Kashyap and Stein (1995, 2000) for US and Ehrmann et al. (2002) for Europe

  Supply function of CDs is not infinitely elastic but upward sloping due to information problems between banks and large depositors.

- *Evidence:* Kashyap, Stein and Wilcox (1993) and Oliner and Rudebusch (1995, 1996)

  - Kashyap, Stein and Wilcox (1993) provide supporting evidence on the effect on investment using the composition of external finance between bank and non bank sources.
  - Oliner and Rudebusch (1995, 1996) provide a critical reinterpretation of the evidence and conclude that the bank lending channel is not supported in the data.

1 Bernanke and Blinder (1988): IS-LM model of lending channel

Bernanke and Blinder (1988) extend the IS-LM model by introducing bank loans as an additional asset (in addition to money and bonds).

Equilibrium in Loan Market

$$L(\rho, i, y) = \lambda(\rho, i) D(1-\tau) \tag{1}$$

The LHS is the demand for loans L, which depends on the interest rate on loans ρ, the interest rate on bonds i , and output y. The RHS denotes the supply of loans, where $D(1-\tau)$ are deposits net of required reserves. The proportion of deposits net of required reserves that banks devote to supplying loans depends on the remuneration of loans relative to the remuneration of bonds, which is captured by the function $\lambda(\cdot)$. Note that $L_i > 0$, $L_y > 0$, $\lambda_\rho > 0$, $\lambda_i < 0$.

Equilibrium in Money Market

$$D(i, y) = m(i) R \tag{2}$$

This is the **LM curve**. The RHS corresponds to the supply of deposits, with $m(i)$ denoting the money multiplier and R total reserves (assume that no cash is held by the public). Note that $m_i > 0$, which reflects the fact that excess reserves, as a fraction of deposits, decrease in their opportunity cost (assumed to be i). The LHS is the demand for deposits, which depends on the interest rate and output. Note that $D_i < 0$ and $D_y > 0$.

Total reserves comprise excess reserves and required reserves:

$$R = E + \tau D, \tag{3}$$

where $E = \varepsilon(i)(1-\tau)D$. Assume $\varepsilon_i < 0$. Combining (2) and (3):

$$m(i) = [\varepsilon(i)(1-\tau) + \tau]^{-1} \tag{4}$$

Equilibrium in Output Market

$$y = Y\,(i, \rho) \tag{5}$$

where $Y_i < 0$ and $Y_\rho < 0$.

Replace (2) in (1)

$$L(\rho, i, y) = \lambda(\rho, i)(1-\tau)m(i)R$$

$$L(\rho, i, y) - \lambda(\rho, i)(1-\tau)m(i)R = 0 \tag{6}$$

Total differential of (6) with respect to ρ and i:

$$\left[L_\rho - \lambda_\rho\,(1-\tau)\,m\,(i)\,R\right]d\rho + \left\{L_i - (1-\tau)\,R\left[\lambda_i m + \lambda m_i\right]\right\}di = 0$$

$$\frac{d\rho}{di} = -\frac{L_i - (1-\tau)\,R\left[\lambda_i m + \lambda m_i\right]}{L_\rho - \lambda_\rho\,(1-\tau)\,m\,(i)\,R}$$

Since $L_i > 0$, $\lambda_i < 0$, $L_\rho < 0$ and $\lambda_\rho > 0$, then $\frac{d\rho}{di} > 0$ if m_i is not too large.

Consider two special cases:

- If loans and bonds are perfect substitutes for borrowers, then $L_\rho \longrightarrow -\infty$. This implies
$$L_\rho \longrightarrow -\infty \qquad \Rightarrow \qquad \frac{d\rho}{di} = 0$$
- If loans and bonds are perfect substitutes for borrowers, then $\lambda_\rho \longrightarrow \infty$. This implies
$$\lambda_\rho \longrightarrow \infty \qquad \Rightarrow \qquad \frac{d\rho}{di} = 0$$

Solve for ρ in (6):

$$\rho = \phi\,(i, y, R) \tag{7}$$

where $\phi_i > 0$, $\phi_y > 0$, and $\phi_R < 0$.

Note that

$$L_\rho \longrightarrow -\infty \text{ or } \lambda_\rho \longrightarrow \infty \qquad \Rightarrow \qquad \phi_i = 0,\ \phi_y = 0, \phi_R = 0$$

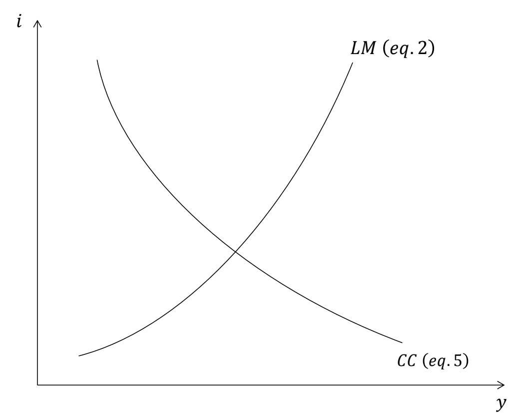
Substitute (7) into (5) to get:

$$y = Y\left[i, \phi\left(i, y, R\right)\right] \tag{8}$$

This is the augmented IS curve, known as **CC curve**.

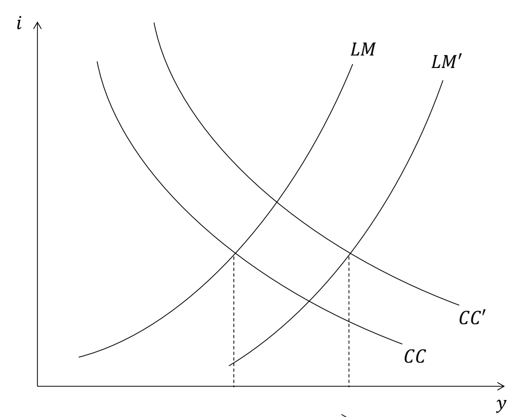
Figure 1 plots the LM curve in (2) and the CC curve in (8). The equilibrium in the economy is at the intersection of both curves.

Figure 1: LM and CC curves



Consider an expansionary monetary policy, i.e. an increase in R. Note that the CC curve reduces to the standard IS curve if $\lambda_\rho \longrightarrow \infty$ or $L_\rho \longrightarrow -\infty$. If this is the case, the effect of monetary policy only goes through shifts of the LM curve (money channel). If money and bonds are perfect substitutes (i.e. $D_i = -\infty$), then the LM curve is flat and the effect of changes in R goes only through shifts in the CC (lending channel). For the general case, an increase in R is more expansionary; the lending channel amplifies the effect of policy. See Figure 2.

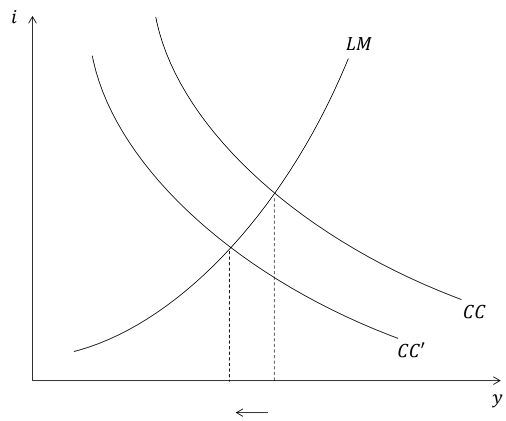
Figure 2: Expansionary monetary policy



Assume now that $\lambda = \lambda(\rho, i, \sigma) - \lambda_\rho > 0$, $\lambda_i < 0$, $\lambda_\sigma < 0$ – where σ denotes riskiness of loans or bankruptcies of financial intermediaries that negatively affect the supply of credit. Note that Bernanke (1983) imputes the severity of the Great Depression to an inward shift in CC due to more bankruptcies.

Consider an autonomous shift in λ due to an increase in σ. This is represented in Figure 3

Figure 3: Increase in σ



If $\sigma \uparrow$, then CC shifts in. To see this, consider the total differential of (7) with respect to y and σ (given i):

$$[1 - Y_\rho \phi_y]\, dy - Y_\rho \rho_\sigma d\sigma = 0$$

$$\frac{dy}{d\sigma} = \frac{Y_\rho \rho_\sigma}{[1 - Y_\rho \phi_y]}$$

Note:

- $Y_\rho < 0$
- $\rho_\sigma > 0$ because $\lambda_\sigma < 0$, $L_\rho < 0$ and $\lambda_\rho > 0$. :
$$\rho_\sigma = \frac{d\rho}{d\sigma} = \frac{\lambda_\sigma}{L_\rho - \lambda_\rho(1-\tau)m(i)R} > 0$$
- $Y_\rho < 0$ and $\phi_y > 0$, so $1 - Y_\rho \phi_y > 0$

Then,

$$\frac{dy}{d\sigma} = \frac{Y_\rho \rho_\sigma}{[1 - Y_\rho \phi_y]} < 0$$

which implies that the CC curve shifts in.

2 Empirical Testing of the Lending Channel

2.1 Empirical tests based on aggregate or semi-aggregate data

Generation I

Testing of the money channel versus the credit channel in its most elementary form has consisted in analyzing, in a bivariate framework, the relationship (tightness, stability, timing) between money and income on the one hand and credit and income on the other (Romer and Romer, 1990).

Generation II

This bivariate horse race is not very convincing. Bernanke and Blinder (1992) suggest an alternative specification using a multivariate model. They include the stock of loans as an additional variable and emphasize that shocks to the Federal Funds Rate lead, with some delay, to a decrease in bank lending. Moreover, an increase in the Fed Funds Rate is initially met by a fall in the stock of securities held by banks. They argue that this is not surprising because lending is a long term contractual arrangement (generally more difficult to modify), so that the shrink in the liability side of banks balance sheets must be met initially by a fall in the holding of securities. In any case, fundamental problems of identification remain. Monetary tightening leads to a decline both in deposits (money) and in bank assets (loans and bonds). Is the subsequent fall in output due to the contraction of money or due to the contraction of credit? Moreover, is the fall in loans really due to supply shocks or does it reflect a fall in the demand for loans?

Generation III

Assume that a monetary tightening reduces the supply of bank credit. Kashyap, Stein and Wilcox (1993) (KSW hereafter) indicate that we should see an increase in bond issues (commercial paper) relative to bank loans to the extent that businesses can substitute (at least partially) one with the other. The change in the composition of credit (with bank loans falling more than other forms of credit) is the distinguishing feature of the lending channel, relative to the standard money view. KSW provide *aggregate* evidence that the relative supply of credit falls in response to a monetary tightening (proxied by Romers' dummies) and that this composition effect has a negative effect on investment.

But Oliner and Rudebusch (1995, 1996), based on *semi-aggregate* data for small and large firms, find no evidence supporting this prediction. Instead, after accounting for differences in the financing patterns of large and small firms, they find that the mix of external financing sources changes little after a monetary shock. They point that small firms are likely to reduce their demand for credit more than large ones if , for instance, the demand for their products is more volatile. Since small firms use less commercial paper (presumably for asymmetric information problems) and more bank loans, one will observe a decrease of bank loans relative to commercial paper in the mix of external financing sources.

How to address these issues?

- **Alternative 1**

  Use *microdata on firms* to test the cross sectional implications of the lending view: tight money should intensify liquidity constraints for small firms, which are more bank dependent. There is evidence of this effect. For instance, Kashyap, Lamont and Stein (1994) show that inventory investment of firms without access to bond markets were more sensitive to financial factors in the 1981-82 recession. However, this is also consistent with the financial accelerator/balance sheet view: tight policy weakens the credit worthiness of firms with more asymmetric information problems and increases their cost to raise funding from any provider, not just banks. We will not review the micro-evidence based solely on firm data in this lecture.

- **Alternative 2**

  Use *microdata on banks* to see whether banks can insulate their balance sheets from policy shock (by issuing CDs). We will review now a couple of papers on this topic.

- **Alternative 3**

  Use *matched bank-firm microdata* to assess how the effect of monetary policy on lending to firms differs according to the characteristics of the banks which firms borrow from, controlling for firm-specific characteristics.

2.2 Empirical tests based on bank microdata

Kashyap and Stein (2000) (KS hereafter) for US; Ehrmann et al. (2003) for Europe; Gambacorta and Marques-Ibanez (2011) for both US and Europe before and during the recent financial crisis.

Imperfect substitutability between deposit and non-deposit sources of funds is a necessary condition for the existence of the lending channel. Crucial idea in KS: use microdata on banks to see whether banks can or cannot use uninsured sources of funds (large CDs) to replace shortfall of insured sources of funds (deposits) caused by monetary tightening by the Central Bank. This boils down to testing whether

$$\frac{\partial}{\partial x}\left[\frac{\partial L}{\partial r}\right] > 0 \quad \left\{\Longrightarrow \frac{\partial}{\partial x}\left[\frac{\partial L}{\partial M}\right] < 0\right\}$$

where r is interest rate under Fed control, x is (good) balance sheet characteristics, and L is bank loans.

2.2.1 A simple model (from Ehrmann et al., 2003)

Banks balance sheet

$$L + S = D + B + C \tag{9}$$

where L is loan, S securities, D (insured) deposits, B (uninsured) funding, and C capital of banks. Banks are monopolistically competitive and face the following demand for loans:

$$L^d = -a_0 r_L + a_1 y + a_2 p, \qquad a_i > 0 \tag{10}$$

where r_L is rate on loan, y is output, p is for prices.

Capital requirement

$$C = \kappa L \tag{11}$$

Banks hold securities to address *liquidity risk* (or for reserve requirements):

$$S = sD \tag{12}$$

Demand for deposits (as a mean of payment)

$$D = -b_0 r_s, \qquad b_0 > 0 \tag{13}$$

where r_s is interest rate on risk free asset (this is the policy tool).

Note:

1. Deposits are not remunerated so their demand cannot be influenced by banks.
2. No y in (13).
3. Banks can affect B by changing r_B. Since B is uninsured and risky, banks must offer a premium above r_S in order to attract B. The premium is a function of (good) balance sheet characteristic x.

$$r_B = r_S(\mu - c_0 x), \qquad c_0 > 0,\ \mu - c_0 x \geqslant 1 \tag{14}$$

Profits for banks

$$\pi = L r_L + S r_s - B r_B - \psi \tag{15}$$

where ψ is administrative costs and remuneration costs for required capital holding. Replace (9)-(13) in (15) and assume equilibrium in loan market, then

$$\pi = L\left(-\frac{1}{a_0}L + \frac{a_1}{a_0}y + \frac{a_2}{a_0}p\right) + sDr_S - \left[(1-\kappa)L - (1-s)D\right] r_B - \psi$$

FOC for L:

$$L = \frac{a_1}{2}y + \frac{a_2}{2}p - \frac{a_0\mu(1-\kappa)}{2}r_S + \frac{a_0 c_0(1-\kappa)}{2}x r_S - \frac{a_0}{2}\frac{\partial\psi}{\partial L}$$

Money view: no information asymmetries, $r_B = r_S$.

Lending view: $r_B \neq r_S$, but x reduces premium $\Longrightarrow$ coefficient of $x r_S > 0$.

2.2.2 Empirical implementation and results

Identifying assumption

Loan demand is homogeneous across banks. I am ruling out, for instance, that large or small bank customers are more interest rate sensitive.

Estimating equations are special case of:

$$\triangle \log L_{it} = \sum_{j=1}^{p} b_j \triangle \log L_{it-j} + \sum_{j=0}^{p} c_j \triangle r_{t-j} + f x_{it-1} + \sum_{j=1}^{p} g_j x_{it-1} \triangle r_{t-j} + ...$$

Implementation

1. Firm-specific effects in error forms?
   (a) No in KS
   (b) Yes in E et al.
2. Estimation procedure
   (a) Two-step procedure in KS
   (b) One-step GMM in E et al.
3. How to measure monetary policy?
   (a) KS: Consider three measures
      - "Narrative approach", Boschen and Mills (1995) index recoded as [-2, -1, 0, 1, 2]
      - Federal fund rate
      - Indicator of monetary policy based on the methodology of Bernanke and Mihov (1998)

   (b) E et al.: Short-term rate
4. Balance sheet characteristics
   (a) Size
   (b) Liquidity
   (c) Capitalization

Results for US (KS)

1. There are significant differences between small and large banks.
2. Within small banks, more liquid banks contract L less than less liquid ones.

Results for Europe (Ehrmann et al.)

1. Size does not matter
2. Cross effect significant and positive as it should be when r is used as a measure of policy, when using liquidity variable.

More recent results for US and Europe (Giambacorta and Marques-Ibanez, 2011)

1. Measure of monetary policy: interest rate
2. Additional balance sheet characteristics considered
   (a) More refined measure of bank capitalization (Tier1 Capital Ratio, T1CR)
   (b) Degree of securitization
   (c) Importance of market funding (relative to deposit funding)
   (d) Moody's expected default risk (EDF)
3. Results – Monetary policy shocks are buffered by:
   (a) Size, but only in crisis period
   (b) Capitalization (measured by T1CR) matters especially in crisis period
   (c) More securitization, in normal times
   (d) More deposit relative to market funding in crisis period
   (e) Lower EDF, during crisis

2.3 Another model for the lending channel

Another related formulation of the conditions necessary for the existence of the bank lending channel can be found in Khwaja and Mian (2008). They actually define the "bank lending channel" as the inability of cushioning lending to firms by banks, following bank specific liquidity shocks (they define the inability of firms to perfectly substitute loans from banks with other sources of funding as the "firm borrowing channel"). The paper is useful also in making clear the importance of controlling for loan demand and suggesting a way to do so when a firm borrows from more than one bank.

Consider a model of a monopolistically competitive bank that maximizes each period profits. Each bank lends to one firm, but firms *may* borrow from more than one bank. In each period t banks maximize profits.

$$\sum_j L_{ijt} r^L_{ijt} - B_{it} r^B_{it}$$

where L_{ijt}denote loans from bank i to firm j, r^L_{ijt} the interest rate charged on those loans, B_{it}non deposit source of financing for the bank and $r^B_{it}$the associate cost. I am assuming that the bank pays zero interest rate on deposits D_{it}. However, the cost of non-deposit source of funding is increasing in their quantity. This is the way in which they introduce the imperfect substitutability between deposit[posit and non-deposit sources of funds.

$$r^B_{it} = r^S + \frac{\alpha_B}{2} B_{it}$$

$r^s$is the safe rate of interest and it is assumed, for simplicity, to be time invariant. The inverse demand function for bank i loans is, instead:

$$r^L_{ijt} = \overline{r_{jt}} - \frac{\alpha_L}{2} L_{ijt}$$

The maximization is subject to the budget constraint:

$$\sum_j L_{ijt} = D_{it} + B_{it}$$

Assume that each bank wants to finance an amount of loans that exceeds deposits. Derive the first order conditions for time t and t *+1* and use the accounting identity to derive a relationship between loans made by each bank and the amount of deposits. Assuming that the change in deposits between *t* and *t+1* has a common component and a bank specific (unanticipated) component, so that:

$$\triangle D_{i,t+1} = \overline{\delta_{t+1}} + \delta_{i,t+1}$$

Similarly, assume that that the change in the position of the loan demand function also has a common and firm specific component

$$\triangle \overline{r_{jt+1}} = \overline{\eta_{t+1}} + \eta_{j,t+1}$$

one can derive the following equation:

$$\triangle L_{ij,t+1} = \frac{1}{(\alpha_L + \alpha_B)}(\alpha_B \overline{\delta_{t+1}} + \overline{\eta_{t+1}}) + \frac{\alpha_B}{(\alpha_L + \alpha_B)}\delta_{i,t+1} + \frac{1}{(\alpha_L + \alpha_B)}\eta_{j,t+1}$$

This equation shows that shocks to deposit of a particular bank have an effect on loans only if $\alpha_B \neq 0$: this is the condition for the existence of a "bank lending channel". Assume one estimates by OLS the following regression:

$$\triangle L_{ij,t+1} = \alpha_{t+1} + \beta_1 \Delta D_{i,t+1} + \beta_2 \eta_{j,t+1} + \varepsilon_{ij,t+1}$$

Assume $\varepsilon_{ij,t+1}$is an idiosyncratic shock uncorrelated with the bank specific shock to deposits or funding, captured by$\Delta D_{i,t+1}$, and the firm specific credit demand, $\eta_{j,t+1}$. The fundamental problem is that $Cov(\Delta D_{i,t+1}, \eta_{j,t+1})$is likely to be non zero (probably positive). Assume one has matched bank-firm level data. Then one can use firm level variables to capture shocks to loan demand (sales, etc.). Assume that information is available also on individual loans and that *firms borrow from multiple banks*, then, in order to obtain a consistent estimate of β_1, one can include a firm specific time effect to control for firm demand.

Note that when one uses loan levels data for firms that borrow from multiple banks, even ifβ_1 differs from zero (denoting the existence of a *local lending channel*), it does not mean that *firms' total borrowing* is affected by a shock to deposits (or to banks' funding in general). On this see Jimenez, Mian, Peydro and Saurina (2011).

2.4 Empirical tests based on matched bank-firm micro-data

Jiménez et al. (2012) show that banks' capitalization and liquidity matter for the transmission of monetary policy. They use loan-, bank-, and firm-level data from the Spanish Credit Registry on loans applications. Since they have matched information on bank loans matched to firm level information, they can identify the bank balance sheet channel as well as the firm balance sheet channel. In particular, they can control for bank and firm time varying characteristics in equations determining the probability of receiving a loan. They show that monetary policy has greater effect on loan granting for banks' in worse balance sheet conditions (lower liquidity and capital). This is also true if one controls for firm specific and time varying effects. This is obviously possible only for firms that have multiple applications active at each point in time (month).

Using the same data and methodology and focusing on the transmission of monetary policy, Jiménez et al. (2014) study the effect of changes in the short-term monetary policy interest rate on the risk composition of the supply of credit. Their findings indicate that, while changes in the long-term rate have no effect on bank-risk taking, a lower overnight interest rate spurs lower capitalized banks to expand and prolong credit to riskier firms, and to lend to riskier new applicants, granting them loans that are larger and longer-term. To identify the compositional changes in the supply of credit the authors account for time-varying bank and firm heterogeneity by incorporating $time \times bank$ and $time \times firm$ fixed effects in their regressions.

3 Related Models

The emphasis on lender balance sheets characterizes also the recent work by Gertler and Kiyotaki (2010) and Gertler and Karadi (2011), who develop a model based on the idea that the moral hazard problem characterizes the financial market lender who can divert a fraction of the assets to itself and away from depositors. We will review these models later.

The emphasis on lender balance sheets in the transmission of monetary policy is also shared by Adrian and Shin (2010, 2014) (hereafter AS). They argue that decreases in the Fed Fund rate are reflected mostly in an increase in the spread between the interest rate on loans, which are of longer maturity, and the (shorter term) interest rate on liabilities that finance those loans. This increases the profitability of financial intermediaries and, hence, forward-looking measures of their capital. This improvement in intermediaries' capitalization increases their capacity to lend and more investment projects are funded. As their balance sheets expand, the risk premium on risky securities (the expected payoff discounted at the safe rate minus one) decreases. They call this the "Risk-Taking Channel of Monetary Policy". AS (2010) offer a simple model to flesh out this mechanism based on a Value at Risk constraint (the worst possible loss must be less or equal to equity; when equity expand, the amount of risky securities (projects) held (funded) by the intermediary increases). The Value at Risk constraint is shown to emerge endogenously in a particular model with moral hazard by AS (2014). Supportive evidence is discussed in AS (2010).

References

Adrian, T., Shin, H.S., 2010. Financial intermediaries and monetary economics, in: Handbook of Monetary Economics. volume 3, pp. 601–650.

Adrian, T., Shin, H.S., 2014. Procyclical leverage and value-at-risk. The Review of Financial Studies 27, 373–403.

Bernanke, B., 1983. Nonmonetary causes of the great depression. American Economic Review .

Bernanke, B.S., Blinder, A.S., 1988. Credit, Money, and Aggregate Demand. The American Economic Review 78, 435–439.

Bernanke, B.S., Blinder, A.S., 1992. The federal funds rate and the channels of monetary transmission. American Economic Review 82, 901–921.

Bernanke, B.S., Mihov, I., 1998. Measuring monetary policy. The quarterly journal of economics 113, 869–902.

Boschen, J.F., Mills, L.O., 1995. The relation between narrative and money market indicators of monetary policy. Economic inquiry 33, 24–44.

Ehrmann, M., Gambacorta, L., Martínez-Pagés, J., Sevestre, P., Worms, A., 2002. Financial Systems and the Role of Banks in Monetary Policy Transmission in the Euro Area. ECB Working Paper 105.

Ehrmann, M., Gambacorta, L., Martinez-Pagés, J., Sevestre, P., Worms, A., Gambacorta Banca, L., Jorge, I., Banco De España, M.P., 2003. The effects of monetary policy in the euro area. Oxford Review of Economic Policy 19, 58–72.

Gambacorta, L., Marques-Ibanez, D., 2011. The bank lending channel: lessons from the crisis. Economic Policy 26, 135–182.

Gertler, M., Karadi, P., 2011. A model of unconventional monetary policy. Journal of monetary Economics 58, 17–34.

Gertler, M., Kiyotaki, N., 2010. Financial Intermediation and Credit Policy in Business Cycle Analysis, in: Handbook of Monetary Economics. volume 3, pp. 547–599.

Jiménez, G., Ongena, S., Peydró, J., Saurina, J., 2014. Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk-Taking? Econometrica 82, 463–505.

Jiménez, G., Ongena, S., Peydró, J.L., Saurina, J., 2012. Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Applications. American Economic Review 102, 2301–2326.

Kashyap, A.K., Lamont, O.A., Stein, J.C., 1994. Credit Conditions and the Cyclical Behavior of Inventories. The Quarterly Journal of Economics 109, 565–592.

Kashyap, A.K., Stein, J.C., 1995. The impact of monetary policy on bank balance sheets. Carnegie-Rochester Conference Series on Public Policy 42, 151–195.

Kashyap, A.K., Stein, J.C., 2000. What Do a Million Observations on Banks Say about the Transmission of Monetary Policy? The American Economic Review 90, 407–428.

Kashyap, A.K., Stein, J.C., Wilcox, D.W., 1993. Monetary Policy and Credit Conditions: Evidence from the Composition of External. The American Economic Review 83, 78–98.

Khwaja, A.I., Mian, A., 2008. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. American Economic Review 98, 1413–1442.

Oliner, S.D., Rudebusch, G.D., 1995. Is There a Bank Lending Channel for Monetary Policy?; Is There a Bank Lending Channel for Monetary Policy? Economic Review, Federal Reserve Bank of San Francisco 2.

Oliner, S.D., Rudebusch, G.D., 1996. Monetary policy and credit conditions: evidence from the composition of external finance: comment. The American Economic Review 86, 300–309.

Romer, D.C., Romer, H.D., 1990. New Evidence on the Monetary Transmission Mechanism. Brookings Papers on Economic Activity 1.