The bank-lending channel: The IS-BL model

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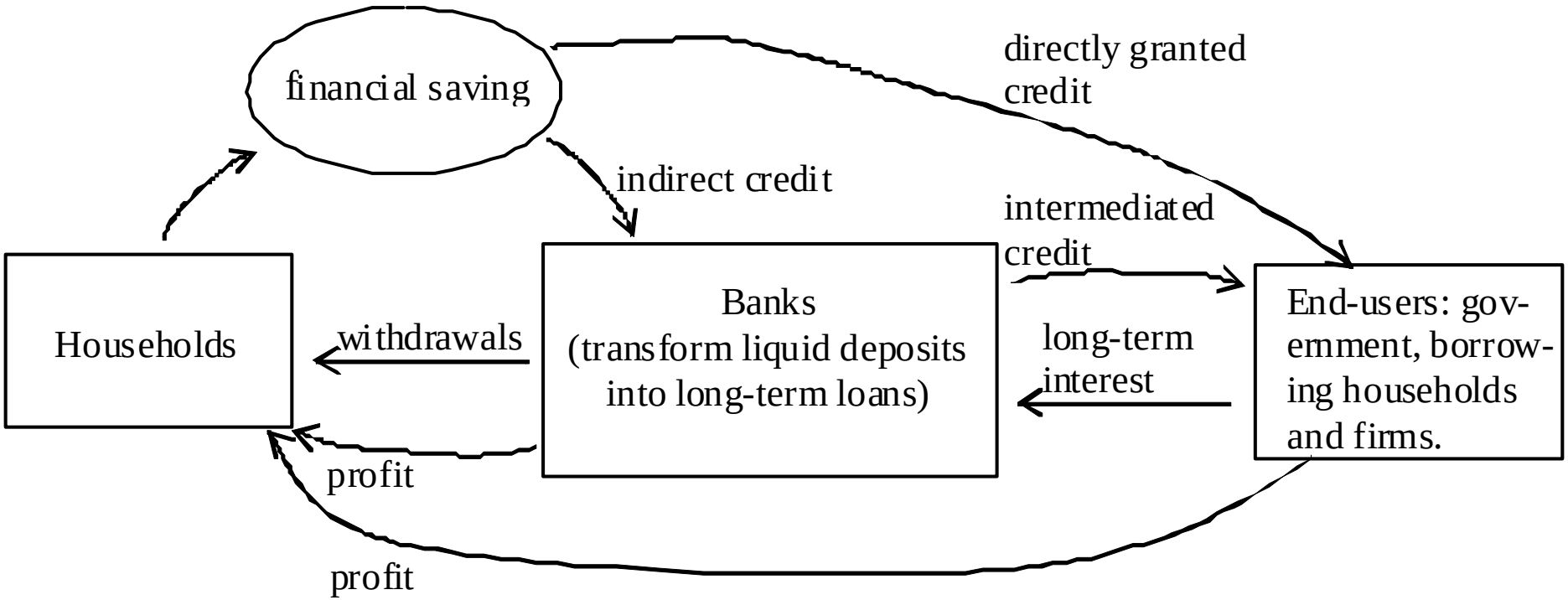

Figure: A stylized financial system.

$i_B =$ bond interest rate (one-period bonds)
$i_L =$ bank lending interest rate (the "lending rate"),
$D =$ deposits of the non-bank private sector (a stock, earns no interest),
$\rho =$ required reserve-deposit ratio, $\rho \in [0, 1)$, exogenous,
$M_0 =$ monetary base,
$mm =$ the money multiplier,
$M_1 \equiv mm \cdot M_0 =$ money supply in the sense of demand deposits in banks (a stock, earns no interest),
$E \equiv M_0 - \rho D =$ excess reserves (a stock, like ρD earning no interest),
$L^s =$ supply of bank loans,
$\sigma =$ perceived riskiness of offering bank loans, a shift parameter,
$B =$ value of the stock of government bonds held by the private sector,
$B_b =$ value of government bonds held by the banks,
$B_n =$ value of government bonds held by the non-bank public,
$W \equiv M_0 + B =$ aggregate nominal financial wealth of private sector,
$P =$ price level, exogenous, $P = 1$,
$Y =$ real aggregate output,
$G =$ real government spending on goods and services, a policy parameter,
$\tau =$ "fiscal tightness", a policy parameter.

Table 2. Balance sheet of the central bank (CB).

Assets		Liabilities
		Currency (here $= 0$)
$\bar{B} - B =$ gov. bonds held by CB		Deposits held by banks (here $= M_0 = \rho D + E$)
Gold		Net worth
Total	$=$	Total $(= D)$

Table 3. Merged balance sheet of the commercial banks.

Assets		Liabilities
$M_0 = \rho D + E =$ reserves (in CB)		$D =$ liquid deposits held by the non-bank public
$L^s =$ loans to the non-bank public		Long-term debt (here $= 0$)
$B_b =$ value of gov. bonds held by commercial banks		Net worth (here $= 0$)
Total	$=$	Total

The supply of bank loans

$$M_0 + L^s + B_b \equiv D.$$

Subtract required reserves, ρD, to get disposable deposits:

$$M_0 - \rho D + L^s + B_b \equiv E + L^s + B_b \equiv (1-\rho)D, \qquad 0 \leq \rho < 1.$$

$e(i_B) =$ desired *fraction of disposable deposits* held as excess reserves.
Assume:

$$E = e(i_B)(1-\rho)D, \qquad e'(i_B) < 0.$$

Supply of *bank loans:*

$$L^s = \ell(i_B, i_L, \sigma)(1-\rho)D, \qquad \ell'_{i_B} < 0, \ell'_{i_L} > 0, \ell'_{\sigma} < 0.$$

The remainder placed in *government bonds:*

$$B_b = (1-\rho)D - (E + L^s).$$

The supply of broad money

Currency is ignored.
The monetary base is M_0 = banks' reserves held in the CB $= \rho D + E$.
The inverse of money multiplier = reserve-deposit ratio:

$$\frac{1}{mm} = \frac{M_0}{M_1^s} = \frac{M_0}{D} = \frac{\rho D + E}{D} = \rho + e(i_B)(1-\rho) \equiv \frac{1}{mm(i_B)}.$$

The money supply then is

$$M_1^s = D = mm(i_B)M_0 > M_0, \qquad mm'(i_B) > 0.$$

Demand for broad money

Table 4. The balance sheet of the non-bank private sector.

Assets		Liabilities
D = bank deposits		L^d = bank loans
B_n = gov. bonds held by non-bank public		W = net worth
Total	=	Total

$$
\begin{aligned}
L^d &= L(Y, i_B, i_L), \qquad L'_Y > 0, L'_{i_B} > 0, L'_{i_L} < 0, \\
M_1^d &= M(Y, i_B), \qquad M'_Y > 0, M'_{i_B} < 0, \\
B_n &= L^d + W - M_1^d, \\
W &\equiv M_0 + B_b + B_n \equiv M_0 + B.
\end{aligned}
$$

General equilibrium

- Equilibrium in the three asset markets. Walras' law of stocks.
- Equilibrium in the output market:

$$\mathfrak{D} = C(Y^p, i_B, i_L, W, \tau) + I(Y, i_B, i_L), \qquad 0 < C_{Y^p} \leq C_{Y^p} + I_Y < 1$$

Analysis

Let M_0 be given (monetary policy instrument).
Derivation of MP curve.
Derivation of IS curve: combine equil. in output market and market for bank loans.

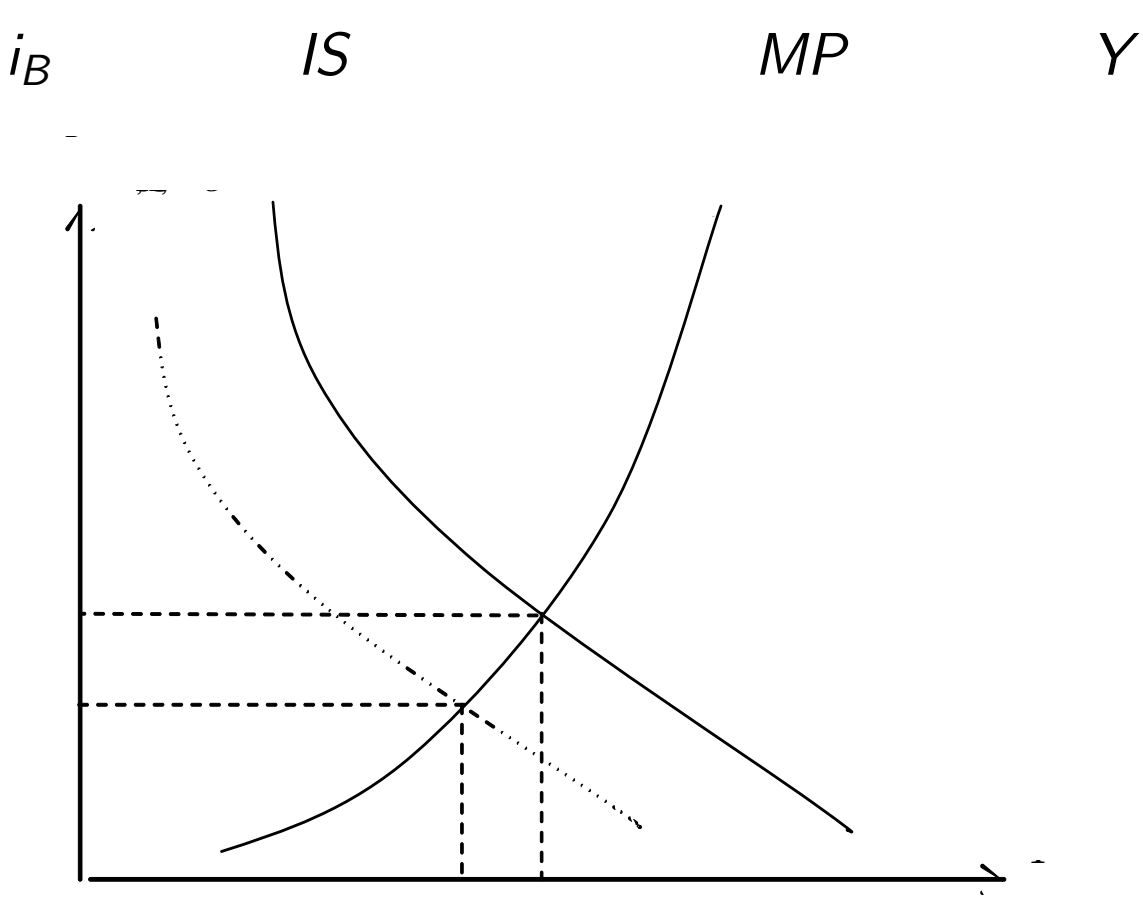

Figure: The IS-MP cross (for fixed M_0, σ, τ, and G). A higher σ shifts the IS curve to the stippled position.

Suppose σ (the perceived riskiness of supplying bank loans) goes up:

$$\sigma \uparrow \Rightarrow i_L \uparrow \Rightarrow i_B \downarrow \text{(for fixed } Y) \Rightarrow \text{IS curve} \downarrow \Rightarrow \begin{cases} i_L - i_B \uparrow \\ Y \downarrow \end{cases}.$$

Expansionary monetary policy: $\Delta M_0 = -\Delta B > 0$. Affects output through two channels:

The *credit channel*:

$$\text{bank loans} \uparrow \Rightarrow i_L \downarrow \Rightarrow \mathfrak{D} \uparrow \Rightarrow \text{IS curve rightward} \Rightarrow \begin{cases} Y \uparrow \\ i_B \uparrow \end{cases}$$

The *interest rate channel*:

$$M_1 \uparrow \Rightarrow i_B \downarrow (\text{for fixed } Y) \Rightarrow \text{MP curve} \downarrow \Rightarrow Y \uparrow .$$

Total effect:

$$\Delta M_0 = -\Delta B > 0 \Rightarrow i_L \downarrow \text{ and } Y \uparrow \text{ while sign of effect on } i_B \text{ ambiguous.}$$