Bank Asset Channel

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CREDIT AND EMPLOYMENT LINKS

- When credit is tight, employers lack the liquidity for investing and hiring:

  – *Credit Channel*.

- When the supply of assets is low, the economy is in shortage of insurance instruments. Employers become more averse to risk and reduce hiring:

  – *Asset Channel*.

- When credit is tight, employers face weaker bargaining conditions with workers.

  – *Bargaining channel.*

THREE SECTOR MODEL

1. **Entrepreneurial sector**

2. **Workers sector**

3. **Financial intermediation sector**

1. Entrepreneurial sector

- Continuum of entrepreneurs with utility $E_0 \sum_{t=0}^{\infty} \beta^t \ln(c_t^i)$

- Technology $F(z_t^i, h_t^i) = z_t^i h_t^i$

  $h_t^i =$ Input of labor
  $z_t^i =$ Idiosyncratic shock observed **after** choosing h_t^i.

- They can hold non-contingent bonds, b_t^i. So the budget constraint is

$$c_t^i + \frac{b_{t+1}^i}{R_t^b} = (z_t^i - w_t)h_t^i + b_t^i$$

1. Entrepreneurial sector (continue)

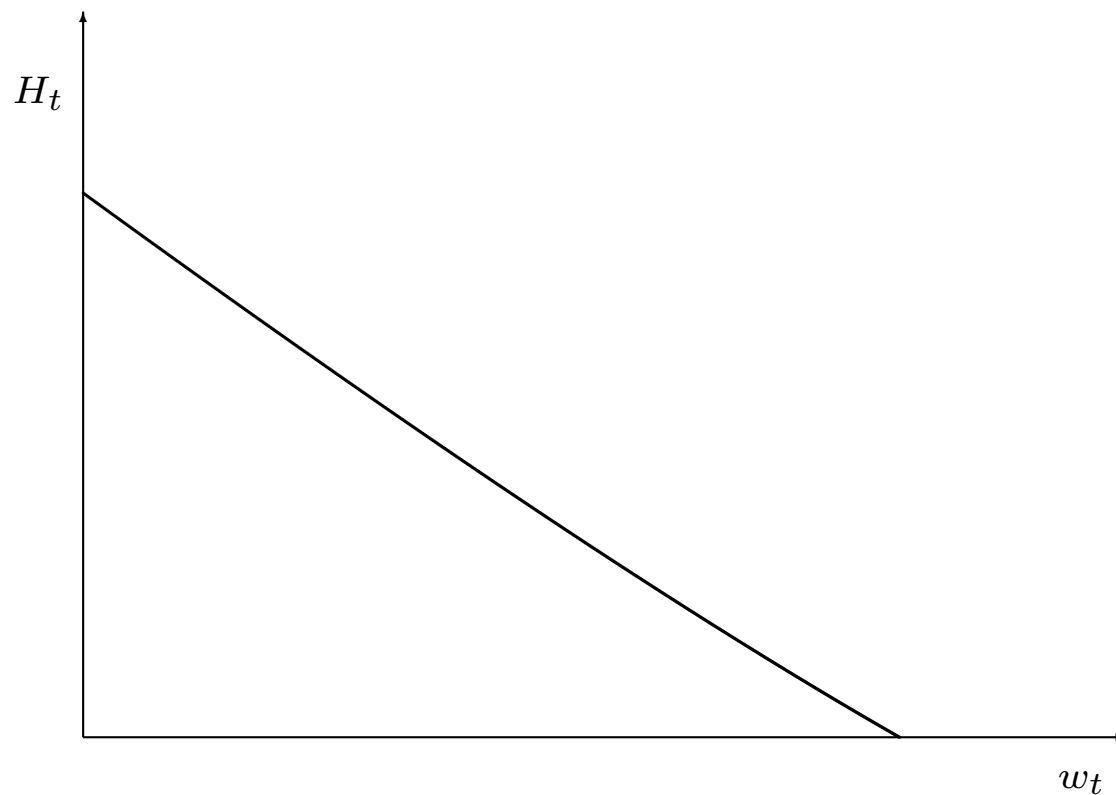Define the entrepreneurial wealth after production (so z_t^i becomes known)

$$a_t^i = b_t^i + (z_t^i - w_t)h_t^i$$

Lemma 1. *Let $\phi(w_t)$ the value of ϕ_t that satisfies $\mathbb{E}_z \left\{ \frac{z-w_t}{1+(z-w_t)\phi_t} \right\} = 0$. The optimal entrepreneur's policies take the form*

$$
\begin{aligned}
h_t^i &= \phi(w_t)b_t^i, \\
c_t^i &= (1-\beta)a_t^i, \\
b_{t+1}^i &= \beta R_t^b a_t^i.
\end{aligned}
$$

Aggregate demand of labor

$$H_t = \phi(w_t) \int_i b_t^i$$

2. Workers sector

- Continuum of workers with utility $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \ln \left(c_t - \alpha \frac{h_t^{1+\nu}}{1+\nu} \right)$

- They hold a non-reproducible asset in fixed supply $\bar{K}$, traded at price p_t. Each unit produces χ units of consumption goods.

- They can borrow subject to the collateral constraint

$$\frac{l_{t+1}}{R_t^l} \leq \eta k_{t+1} p_t$$

- Budget constraint

$$c_t + l_t + (k_{t+1} - k_t)p_t = \frac{l_{t+1}}{R_t^l} + w_t h_t + \chi k_t$$

2. Workers sector (continue)
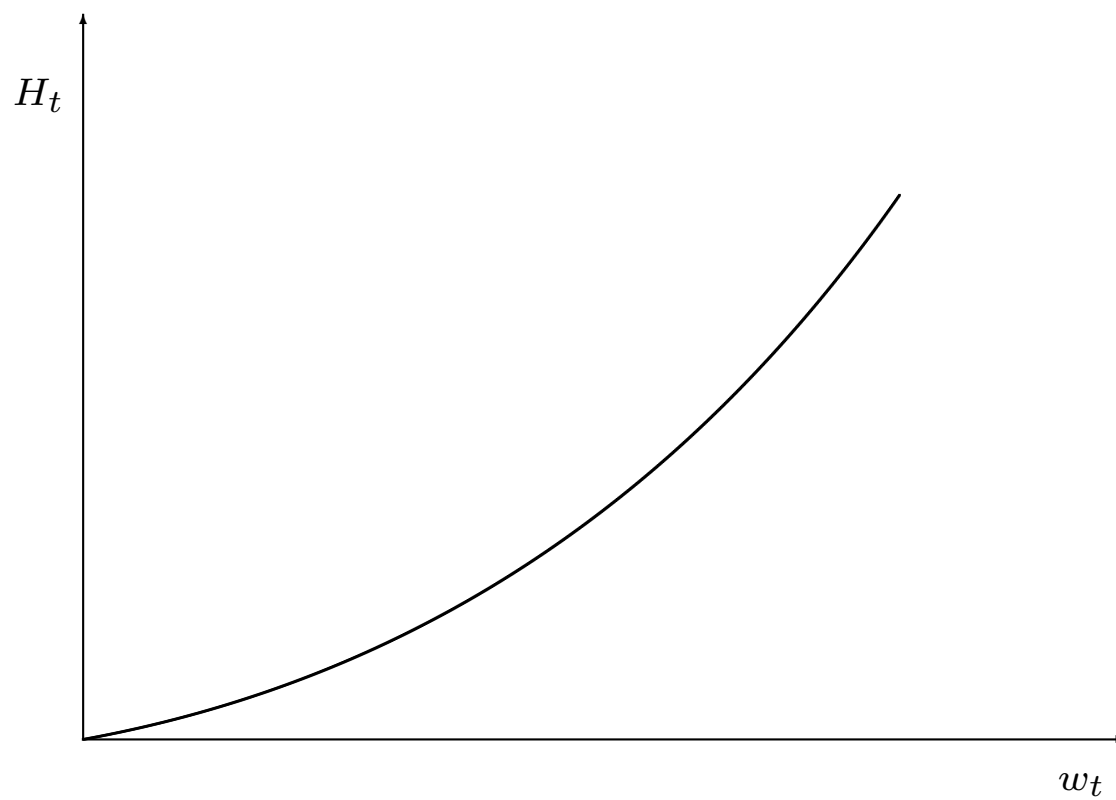
First order conditions

$$\alpha h_t^{\nu} = w_t,$$

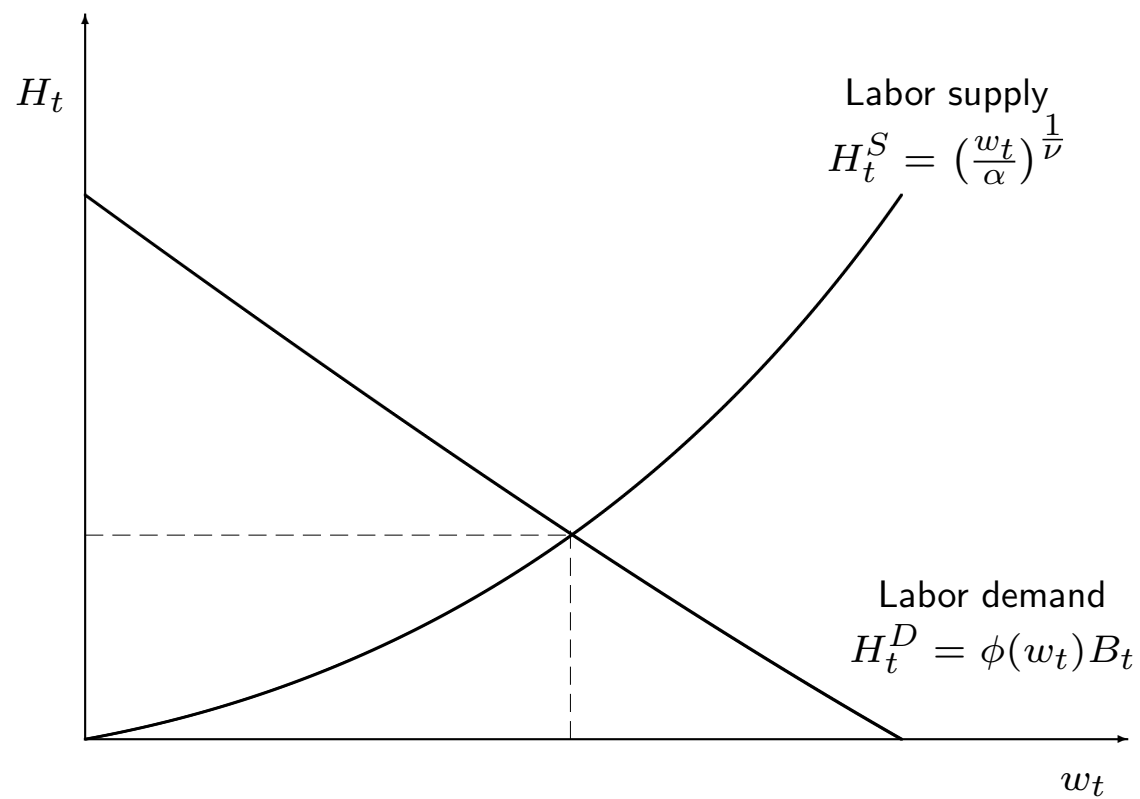$$U_c(c_t, h_t) \geq \beta R_t^l \mathbb{E}_t U_c(c_{t+1}, h_{t+1}),$$

$$U_c(c_t, h_t) \geq \beta \mathbb{E}_t U_c(c_{t+1}, h_{t+1}) \left(\frac{\chi + p_{t+1}}{p_t} \right).$$

Aggregate supply of labor

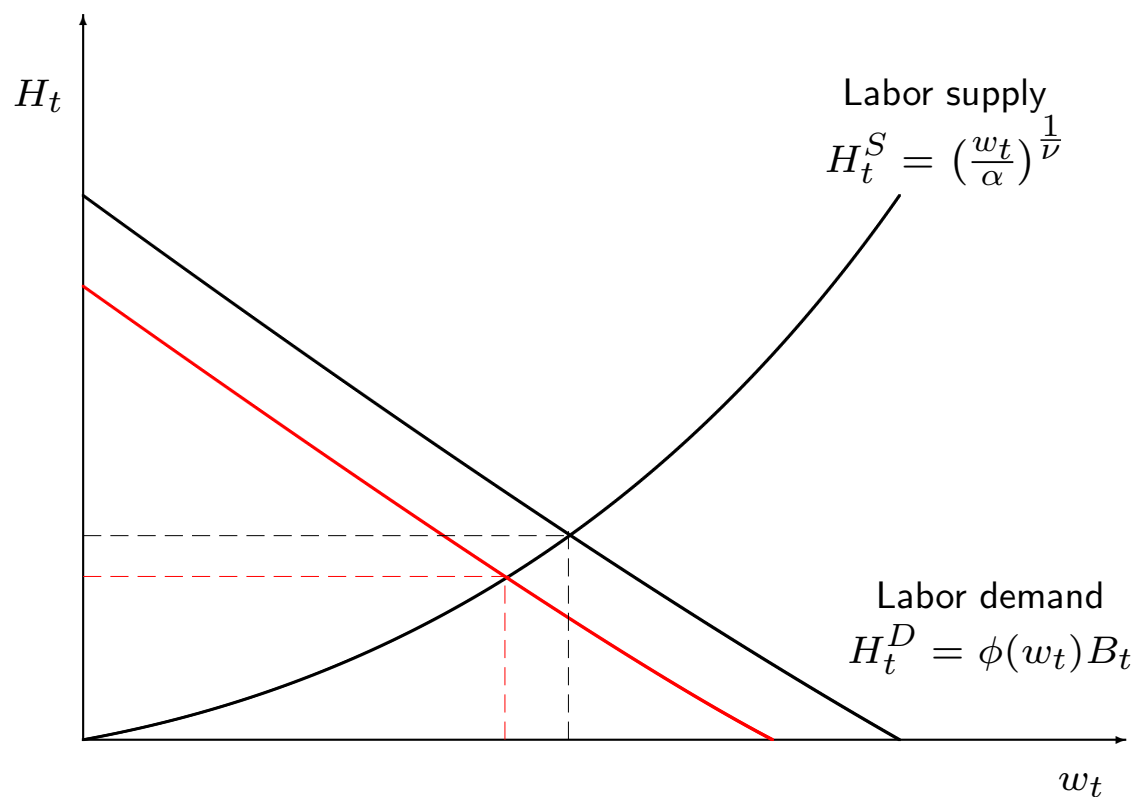$$H_t = \left(\frac{w_t}{\alpha}\right)^{\frac{1}{\nu}}$$

LABOR MARKET EQUILIBRIUM

Labor supply
$$H_t^S = \left(\frac{w_t}{\alpha}\right)^{\frac{1}{\nu}}$$

Labor demand
$$H_t^D = \phi(w_t)B_t$$

LABOR MARKET EQUILIBRIUM
(Decreased supply of assets)

Labor supply
$$H_t^S = \left(\frac{w_t}{\alpha}\right)^{\frac{1}{\nu}}$$

Labor demand
$$H_t^D = \phi(w_t)B_t$$

THERE IS NOT INTERMEDIATION

(Borrowing and lending is direct)

EQUILIBRIUM WITH DIRECT LENDING

- Market clearing in lending

$$B_{t+1} = L_{t+1}$$

- Interest rates

$$R_t^b = R_t^l < \frac{1}{\beta}$$

- Binding borrowing constraint in steady state

$$\frac{L}{R} = \eta \bar{K} p$$

INTRODUCING

THE INTERMEDIATION SECTOR

3. Intermediation sector

- Continuum of investors with utility $\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \ln(c_t)$

- Hold diversified portfolio of banks and consume their dividends, d_t.

- Banks discount future dividends by $m_{t+1} = \beta \left(\frac{d_t}{d_{t+1}} \right)$

- Banks' budget constraint

$$b_t + \frac{l_{t+1}}{R_t^l} + d_t = l_t + \frac{b_{t+1}}{R_t^b}$$

- Banks' no-default constraint

$$\frac{b_{t+1}}{R_t^b} \leq \xi_t \left(\frac{l_{t+1}}{R_t^l} \right)$$

Bank's problem

$$
V_t(b, l) = \max_{d, b', l'} \left\{ d + Em'V_{t+1}(b', l') \right\}
$$

$$
\text{subject to:}
$$

$$
b + d + \frac{l'}{R^l} = l + \frac{b'}{R^b}
$$

$$
\frac{b'}{R^b} \leq \xi \left(\frac{l'}{R^l} \right)
$$

First order conditions

$$
R^b Em' = 1 - \mu
$$

$$
R^l Em' = 1 - \mu\xi
$$

Endogenous ξ

Assumption 1. *In the event of liquidation, the bank's assets l are perfectly divisible and can be sold either to other banks or to other sectors (households or entrepreneurs). However,*
- Banks can recover a fraction $\overline{\xi}$ of the liquidated assets;
- Other sectors can recover a smaller fraction $\underline{\xi} < \overline{\xi}$.

Assumption 2. *Banks can purchase the assets of liquidated banks only if they have liquidity.*

Definition. *Banks are* **liquid** *if the enforcement constraint is not binding,*

$$\frac{b'}{R^b} < \xi \left(\frac{l'}{R^l} \right)$$
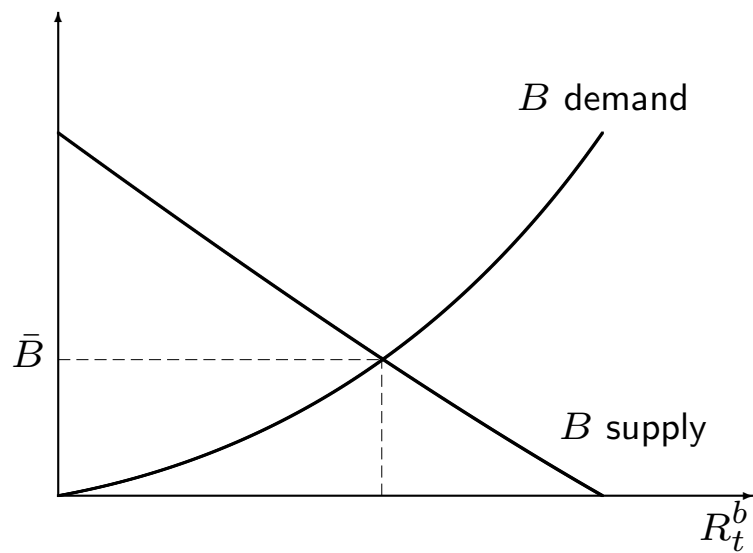
Multiple equilibria

- If the market expects $\xi_t = \bar{\xi}$, banks will not borrow up to the limit and the ex-post price of the liquidated assets is $\xi_t = \bar{\xi}$.

- If the market expects $\xi_t = \underline{\xi}$, banks will borrow up to the limit and the ex-post price of the liquidated assets is $\xi_t = \underline{\xi}$.
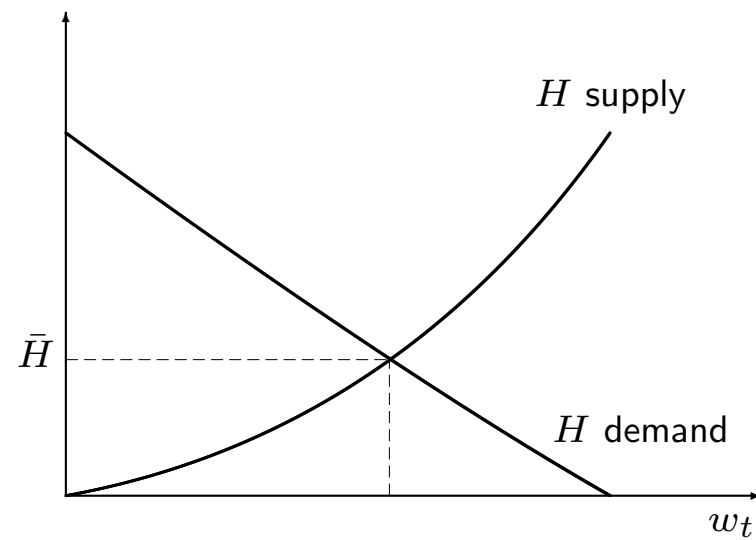
The anatomy of a banking crisis

1. The market turns pessimistic

2. Banks need more (costly) equity to fund loans. So they cut lending and issue less liabilities.

3. In equilibrium, the lower supply of liabilities implies that entrepreneurs hold less bonds b_t which in turn discourages the demand of labor.
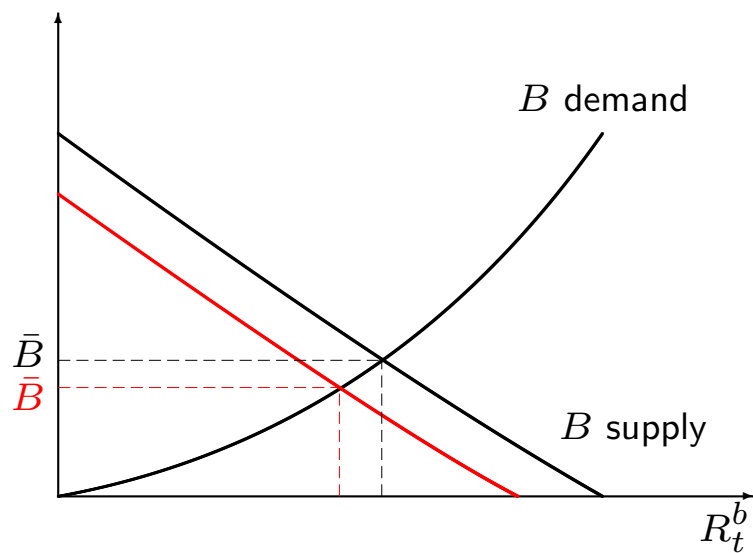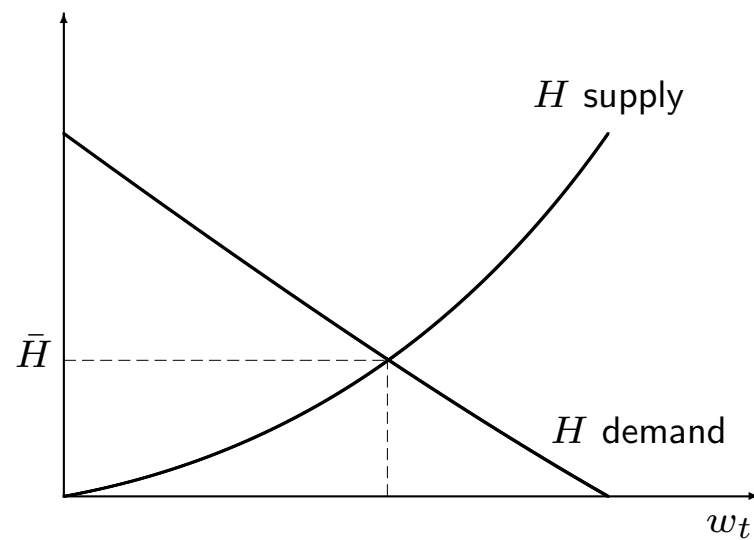
GENERAL EQUILIBRIUM

ASSET MARKET

B demand

$\bar{B}$

B supply

R_t^b

LABOR MARKET

H supply

$\bar{H}$

H demand

w_t

GENERAL EQUILIBRIUM (banking crisis)

ASSET MARKET

B demand

B supply

$\bar{B}$

$\bar{B}$

R_t^b
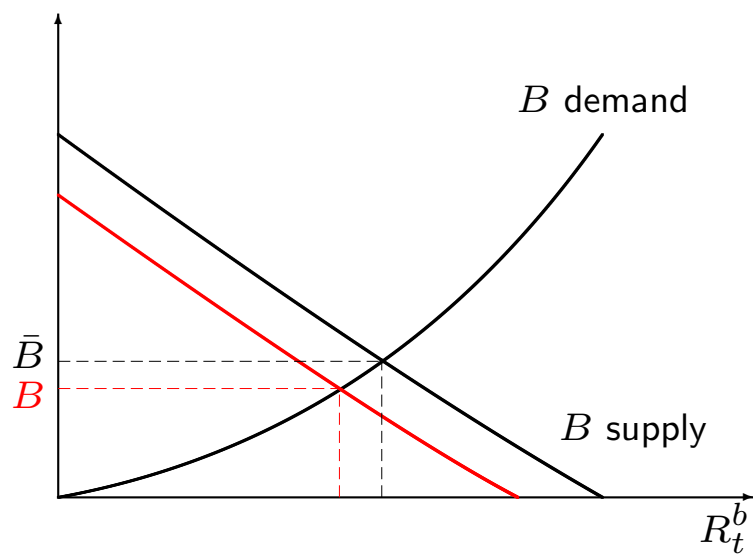
LABOR MARKET

H supply

H demand

$\bar{H}$

w_t

GENERAL EQUILIBRIUM (banking crisis)

ASSET MARKET

LABOR MARKET