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## Non-Neutrality of Open-Market Operations

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# Non-Neutrality of Open-Market Operations

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- Several central banks around the world (Bank of England, Bank of Japan, ECB, Fed, Riksbank) are holding **risky** securities in their balance sheets (*unconventional* monetary policy).
- **Main question:** Do these policies have any effect at all on the economy?
  - 1 Is unconventional policy an additional dimension of monetary policy?
  - 2 Are there any consequences on equilibrium *output* and *inflation* of the possible income losses on risky securities?
- A negative answer to the above questions points toward the irrelevance (*“neutrality”*) of open-market operations.

# Proposition of Neutrality

- **Proposition of Neutrality:** *Given a conventional monetary policy, any alternative CB balance-sheet policy is consistent with the same equilibrium output and prices.*
- ⇒ Open-market operations are irrelevant for equilibrium output and inflation.
- *Main intuition:* if the central bank bears some risk that was before in the hands of the private sector, the materialization of that risk does not affect equilibrium output and inflation if it is ultimately borne by the private sector.
  - Neutrality granted by specific transfer policies:
    - 1 between central bank and treasury (key is the separation of treasury and central bank balance sheets);
    - 2 between treasury and private sector.

# Real Bills Doctrine 2.0

- **RBD 1.0:** the CB holds “Real Bills” (safe short-term assets, thereby CB always profitable) and sets the discount rate on these assets by open-market operations in order to control the value of money (inverse of the price level).

⇒ Real Bills provide the backing of the value of currency

- **RBD 2.0:** if neutrality holds, the CB can still control the value of money by setting the discount rate on safe securities *independently* of what it holds in its balance sheet. How is it possible?

⇒ Taxpayers provide the backing of the value of currency

- 1 Discuss monetary and fiscal policy regimes under which the Proposition of Neutrality holds:
  - passive fiscal policy, and
  - passive remittances' policy (or full treasury's support)
- 2 Under a passive fiscal policy, but in absence of treasury's backing of central bank's losses, Proposition of Neutrality does not hold unless losses are
  - limited in time, and
  - limited in size.
- 3 Under an active fiscal policy, Proposition of Neutrality never holds.
- 4 Trade-off between *financial* independence and *target* independence.

- Propositions of Neutrality (Wallace, 1981, Sargent and Smith, 1987, Eggertsson and Woodford, 2003, Robatto, 2014);
- Relationship between central bank's financial strength and objectives of monetary policy (Sims, 2000, 2005, Del Negro and Sims, 2014, Stella 1997, 2005);
- Implications of accounting procedures and remittance policies for central bank's solvency (Bassetto and Messer, 2013; Hall and Reis 2013);
- Fiscal Theory of the Price Level (Sargent and Wallace, 1981, Sargent, 1982, Leeper, 1991; Sims, 1994,2013; Woodford, 1995,1995).

Equilibrium in the money market:

$$\frac{M_t}{P_t} \geq L(Y_t, i_t; \mathbf{z}_t); \quad (1)$$

Aggregate demand:

$$Y_t = E_t \Gamma(Y_{t+1}, i_t - \Pi_{t+1}; \mathbf{z}_t); \quad (2)$$

Aggregate supply:

$$\Pi_t = E_t \Upsilon(Y_t, \Pi_{t+1}; \mathbf{z}_t). \quad (3)$$

- **Conventional monetary policy** specifies one between  $\{i_t, M_t\}$  (possibly as functions of other variables)
- “*REE*”: a collection of stochastic processes  $\{Y_t, \Pi_t, i_t, M_t\}$  satisfying equations (1)-(3) consistently with the specification of *conventional monetary policy* and subject to  $i_t \geq 0$ , given exogenous process  $\{\mathbf{z}_t\}$ .



- Given the “equilibrium” processes  $\{Y_t, \Pi_t, i_t, M_t\}$  one can evaluate the pricing kernel  $\tilde{R}_{t,T}$ , the price of long-term securities  $Q_t$  and their return  $1 + r_t$ .
- Consider an “equilibrium” allocation  $\{Y_t^*, \Pi_t^*, i_t^*, M_t^*, Q_t^*, r_t^*, \tilde{R}_{t,T}^*\}$  that satisfies equations (1)–(3) and asset-price conditions, for a given *conventional monetary policy* and balance-sheet policies  $\{B_t^C, D_t^C\}$  where
  - $B_t^C$  : treasury bills held by the CB
  - $D_t^C$  : long-term risky securities held by the CB (private or public)
- consider alternative balance-sheet policies  $\{\tilde{B}_t^C, \tilde{D}_t^C\}$ .
- These alternative *balance-sheet policies* are said to be “neutral” if  $\{Y_t^*, \Pi_t^*, i_t^*, M_t^*, Q_t^*, r_t^*, \tilde{R}_{t,T}^*\}$  is still an equilibrium for the same *conventional monetary policy*.
- How could it not be so? Nothing has changed in equilibrium conditions (1)–(3) nor in the policy rule...

- The reason behind neutrality is deeper: the candidate equilibrium should be consistent –for any balance-sheet policies– with
  - 1 the solvency condition (intertemporal budget constraint) of the central bank:

$$\begin{aligned} \frac{X_{t-1}}{P_t^*} + \frac{M_{t-1}^*}{P_t^*} - \frac{B_{t-1}^C}{P_t^*} - (1 + r_t^*) \frac{Q_{t-1}^* D_{t-1}^C}{P_t^*} \\ = E_t \sum_{T=t}^{\infty} \tilde{R}_{t,T}^* \left[ \frac{i_T^*}{1 + i_T^*} \frac{M_T^*}{P_T^*} - \frac{T_T^C}{P_T^*} \right], \end{aligned}$$

- 2 the solvency condition of the treasury:

$$\frac{B_{t-1}^G}{P_t^*} + (1 + r_t^*) \frac{Q_{t-1}^* D_{t-1}^G}{P_t^*} = E_t \sum_{T=t}^{\infty} \tilde{R}_{t,T}^* \left[ \frac{A_T}{P_T^*} + \frac{T_T^C}{P_T^*} \right],$$

- ...both, considered together, are the mirror image of the transversality condition of households.

# Transfers' policies supporting neutrality

- How to get neutrality?

- 1 “Passive” remittances’ policy:

$$\frac{T_t^C}{P_t} = \bar{T}^C + \frac{\Psi_t^C}{P_t} + \psi_t \frac{N_{t-1}}{P_t}, \quad (4)$$

where  $\Psi_t^C$  are central-bank profits, and  $1 - \Pi_t < \psi_t \leq 1$  for each  $t$

- 2 and “passive” fiscal policy:

$$\frac{A_t}{P_t} = \bar{a} - \frac{T_t^C}{P_t} + \phi \left[ \frac{(1 + r_t) Q_{t-1} D_{t-1}^G + B_{t-1}^G}{P_t} \right] \quad (5)$$

for some  $\bar{a}$  and  $\phi$ , with  $0 < \phi < 1$ .

- (4): treasury transfers resources to the central bank in the case of negative profits;
- (5): treasury gets these resources from the private sector through higher lump-sum taxes:

⇒ risk remains in the hands of the private sector.

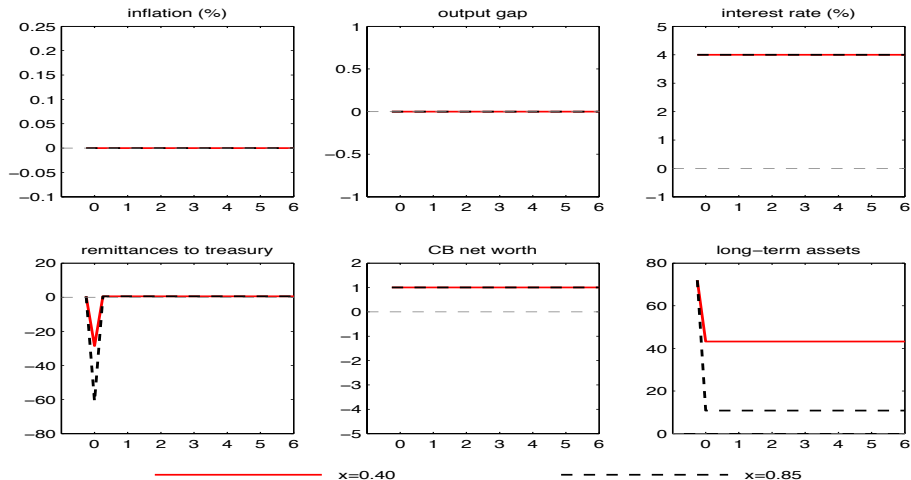
# What have we learnt?

- If there is full treasury's support and passive fiscal policy, unconventional monetary policy is not an additional dimension of monetary policy.
- If it is effective, it is because private sector understands there is a change in **conventional** policy.
- But, there is no need of engaging in unconventional monetary policy if central bank is able to communicate in a transparent way a change in **conventional** policy.
- A case of full treasury's support: in 2009 Bank of England and UK Treasury established a wholly-owned subsidiary called Bank of England Asset Purchase Facility Fund Limited with the responsibility of buying private and public long-term securities. Any financial losses as a result of the asset purchases are borne by the Treasury and any gains are owed to the Treasury.

## Credit risk due to partial default on long-term securities:

- Shock hits unexpectedly at time 0;
  - ① “Mild” credit event, haircut of 40%;
  - ② “Strong” credit event, haircut of 85%;
- ⇒ Optimal monetary policy stabilizes inflation and output gap when credit risk is in the hands of the private sector ( $D_t^C = 0$ , for all  $t$ );
- ⇒ Optimal monetary policy *is the same* if CB holds risky securities ( $D_t^C > 0$ , for some  $t$ ) and if there is
  - ✓ full treasury’s support, and
  - ✓ passive fiscal policy

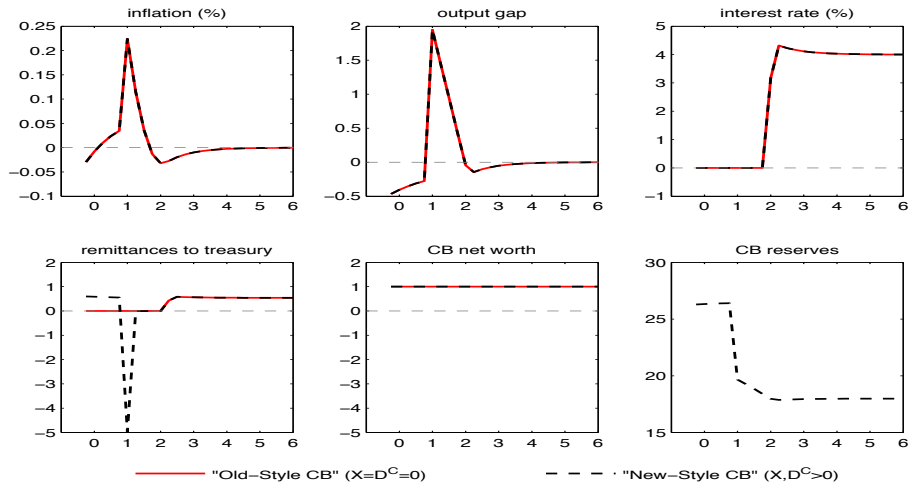
# Credit risk



## Interest-rate risk due to exit strategy from liquidity trap:

- Economy is in trap with natural rate of interest of -2% (annual);
  - Probability of 10% of reversal to a normal value of 4% (annual);
  - Ex-post duration: 4 quarters (time at which there is the unexpected movement in the yield curve);
- ⇒ Optimal monetary policy is to exit from liquidity trap after 6 quarters when interest-rate risk is in the hands of the private sector ( $D_t^C = 0$ , for all  $t$ );
- ⇒ Optimal monetary policy *is the same* if CB holds risky securities ( $D_t^C > 0$ , for some  $t$ ) and if there is
- ✓ full treasury's support, and
  - ✓ passive fiscal policy

# Interest-rate risk





# Absence of treasury's support, ( $T_t^C \geq 0$ )

- Negative profits translate into declining net worth:

$$N_t = N_{t-1} + \Psi_t^C - T_t^C < N_{t-1}.$$

- Rewrite solvency condition of CB as

$$\underbrace{\frac{N_t}{P_t^*} + E_t \sum_{T=t}^{\infty} \tilde{R}_{t,T}^* \left( \frac{i_T^*}{1+i_T^*} \frac{M_T^*}{P_T^*} \right)}_{\substack{\text{real net worth + expected PV} \\ \text{of future seigniorage revenue} \\ \text{(value of CB)}}} = \underbrace{E_t \sum_{T=t+1}^{\infty} \tilde{R}_{t,T}^* \left( \frac{T_T^C}{P_T^*} \right)}_{\substack{\text{expected PV of real transfers} \\ \text{to and from the Treasury} \\ \text{(dividends)}}}.$$

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⇒ With treasury's support: **RHS adjusts for any level reached by net worth**

⇒ Without treasury's support: **lower bound on net worth**

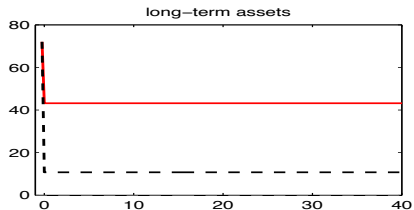
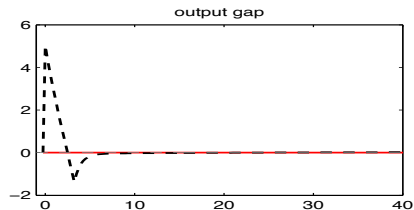
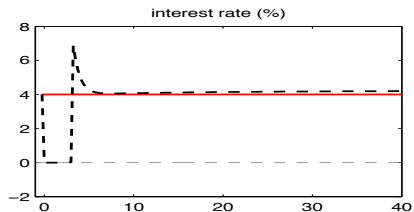
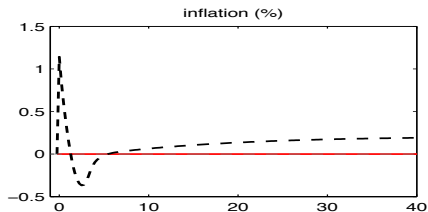
# Deferred-Asset Regime

- The CB absorbs losses by reducing capital (or writing a deferred asset) and retains future profits until capital returns to the initial level (the deferred asset is paid in full). (See Federal Reserve).
- If fiscal policy is passive, Proposition of Neutrality does not hold unless central-bank losses are limited in:
  - 1 **time**  
otherwise CB may not have room to shift losses to the private sector
  - 2 **size**  
otherwise lower-bound on net worth may be violated, or profitability be permanently impaired (if  $N_t + M_t < 0$ : assets less than interest-bearing liabilities).

# What have we learnt?

- If the treasury does not recapitalize the central bank, proposition of neutrality does not hold.
- But, **temporary** unconventional monetary policies resulting in **small** income losses have no effect on equilibrium output and inflation unless they are understood to be a change in **conventional** policy.
- **Recurrent** unconventional monetary policies have effects on equilibrium output and inflation, but they are sub-optimal with respect to what can be achieved by full commitment through standard **conventional** policies.
- **Temporary** unconventional monetary policies resulting in **large** losses can be inflationary: losses can only be absorbed in the long run if CB raises price level to increase private holdings of currency, restore profitability and increase seigniorage.

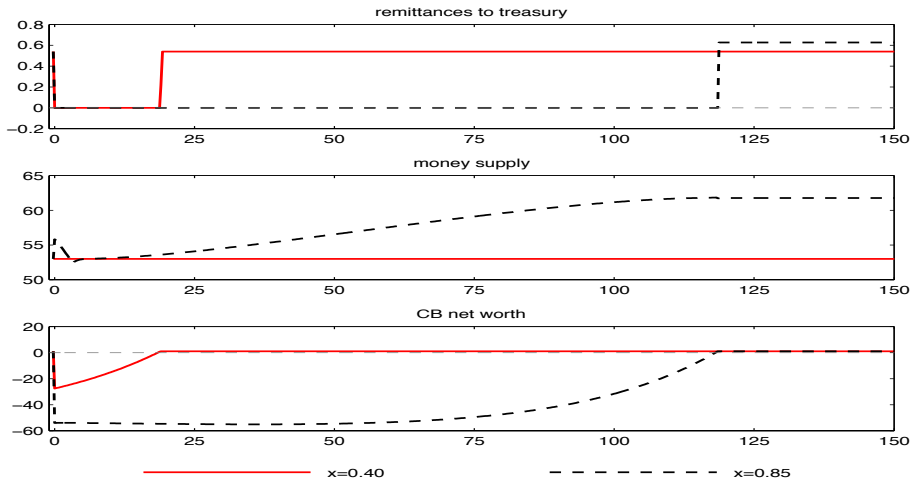
# Credit risk



— x=0.40

- - - x=0.85

# Credit risk



# Financial Independence

- Central banks might refuse for "political" reasons to receive transfers from treasury or/and might be averse to periods of declining net worth. Therefore, they can be afraid of creating income losses internalizing a non-negative constraint on profits:

$$T_t^C = \Psi_t^C \geq 0$$

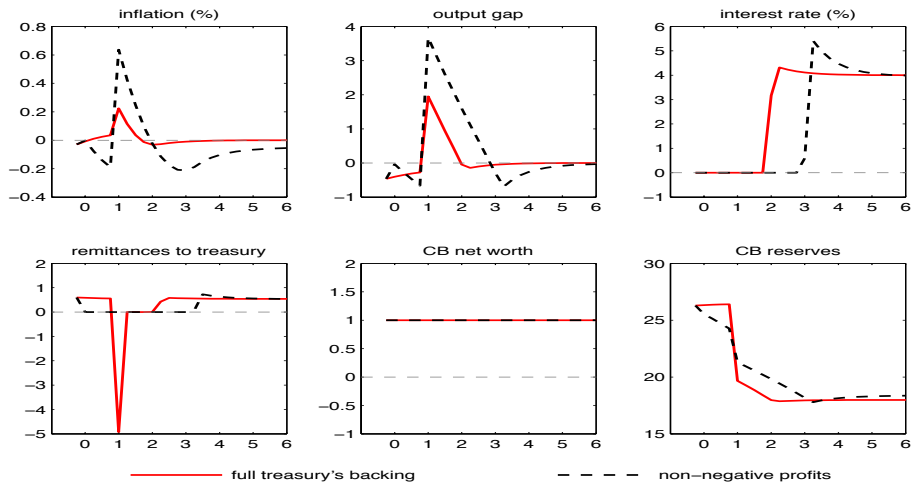
- If central bank holds only short-term risk-free assets ( $D_t^C = 0$ , for all  $t$ ) the lower-bound constraint on profits is never binding.
  - If central bank holds also long-term risky securities, the lower-bound constraint on profits can be binding.
- ⇒ Proposition of Neutrality never holds and the central bank needs to change its *conventional* monetary-policy stance to satisfy constraint on profits.

# What have we learnt?

- ⇒ If central bank wants to maintain financial independence **unconventional** monetary policy can signal a change in the **conventional** monetary-policy stance.
- Starting from a sub-optimal equilibrium can signal a commitment to a better policy. But it is a worse outcome than full commitment through standard conventional policies.
- In a liquidity trap, committing to reduce or avoid at all income losses signals higher inflation and a delayed exit when there is interest-rate risk.
- There is a trade-off between *financial* independence and *target* independence.



# Financial Independence: interest rate risk



- Irrelevance of quantitative-easing policies is a quite pervasive result given current institutional settings.
- QE can be effective if:
  - ① it signals a different **conventional** monetary policy;
  - ② losses are recurrent and/or sizeable implying that the central bank should change **conventional** policy to restore its solvency;
  - ③ central bank commits to reduce possible income losses (financial independence);
  - ④ fiscal policy is active (FTPL).
- We should not expect central bank to continue indefinitely with unconventional asset purchases. They lead to sub-optimal equilibria with respect to what can be achieved with full commitment using conventional monetary-policy instruments.