

# CREDIT CONSTRAINTS AND QUANTITATIVE EASING



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## THE PAPER

- Agents: unconstrained Households, constrained Households, intermediate-good firms, final-good firms, a government and a monetary authority.
- The constrained households behave in a hand-to-mouth fashion.
- QE is introduced using the portfolio rebalancing channel.
- Characterizing the effect of QE on output analytically and numerically.

## PORTFOLIO REBALANCING

- Assets of different maturities are imperfect substitutes.
- If assets are imperfect substitutes, changes in the demand for one asset would change the relative price of that asset. As such, the Central Bank can use QE asset purchases to alter the relative price of long-term assets, thereby changing the yields of these assets.
- This could lead to effects on real economic activity.

## ANALYTICAL RESULTS

- The share of the hand-to-mouth households:  $\omega$

- Define:

$$\hat{y}_t = A_M \widehat{b}_t^{CB} \quad (1)$$

$A_M$  measures the response of output to quantitative easing.

- The solution:

$$A_M = \frac{(1-\omega)(1-\beta\rho_M)(1-g)(1-\omega\sigma\Omega)\left(\frac{NM_1}{\Delta_1}\right)}{\sigma(1-\beta\rho_M)(1-\rho_M)(1-\omega\sigma\Omega)M_2 - \kappa(1-\omega)\rho_M[\sigma M_2 + (1-g)(v + \sigma\omega\Omega)M_1]} \quad (2)$$

- If  $\omega = 0$ :

$$A_M = \frac{(1-g)\bar{c}_P N_2}{\sigma\Delta_1} \quad (3)$$

$N_2$  is a function of structural parameters.

- If  $\omega = 1$ :  $A_M = 0$ . Therefore, QE is completely ineffective if all households are constrained.

## HOUSEHOLDS

The problem of the representative patient household:

$$\max_{\{c_{P,t}, n_{P,t}, b_t^S, b_t^L\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_P^t \left( \frac{c_{P,t}^{1-\sigma}}{1-\sigma} - \chi_P \frac{n_{P,t}^{1+\nu}}{1+\nu} \right) \quad (4)$$

subject to the budget constraint:

$$c_{P,t} + \frac{b_t^S}{R_t^S P_t} + \frac{b_t^L}{R_t^L P_t} \left[ 1 + \frac{\psi}{2} \left( \phi \frac{b_t^S}{b_t^L} - 1 \right)^2 \right] \leq w_{P,t} n_{P,t} + \frac{b_{t-1}^S}{P_t} + \frac{b_{t-1}^L}{P_t} - T_{P,t} + \Pi_{P,t} \quad (5)$$

The third term on the left-hand side is the adjustment cost between short-term and long-term assets.

The solution gives:

$$\beta \mathbb{E}_t \left( \frac{c_{P,t+1}}{c_{P,t}} \right)^{-\sigma} = \mathbb{E}_t \pi_{t+1} \left[ \frac{1}{R_t^S} + \frac{\psi\phi}{R_t^L} \left( \phi \frac{b_t^S}{b_t^L} - 1 \right) \right] \quad (6)$$

$$\beta \mathbb{E}_t \left( \frac{c_{P,t+1}}{c_{P,t}} \right)^{-\sigma} = \frac{\mathbb{E}_t \pi_{t+1}}{R_t^L} \left[ 1 + \frac{\psi}{2} \left( \phi \frac{b_t^S}{b_t^L} - 1 \right)^2 - \psi\phi \left( \phi \frac{b_t^S}{b_t^L} - 1 \right) \frac{b_t^S}{b_t^L} \right] \quad (7)$$

The problem of the representative hand-to-mouth household:

$$\max_{\{c_{I,t}, n_{I,t}\}_{t=0}^{\infty}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_I^t \left( \frac{c_{I,t}^{1-\sigma}}{1-\sigma} - \chi_I \frac{n_{I,t}^{1+\nu}}{1+\nu} \right) \quad (8)$$

subject to the following budget constraint:

$$c_{I,t} \leq w_{I,t} n_{I,t} - T_{I,t} \quad (9)$$

The hand-to-mouth households are not engaged in the financial markets.

## MONETARY POLICY

The central bank provides liquidity ( $b_t^{CB}$ ) according to:

$$\ln \left( \frac{b_t^{CB}}{\bar{b}^{CB}} \right) = \rho_M \ln \left( \frac{b_{t-1}^{CB}}{\bar{b}^{CB}} \right) + \xi_{M,t} \quad (10)$$

## NUMERICAL RESULTS

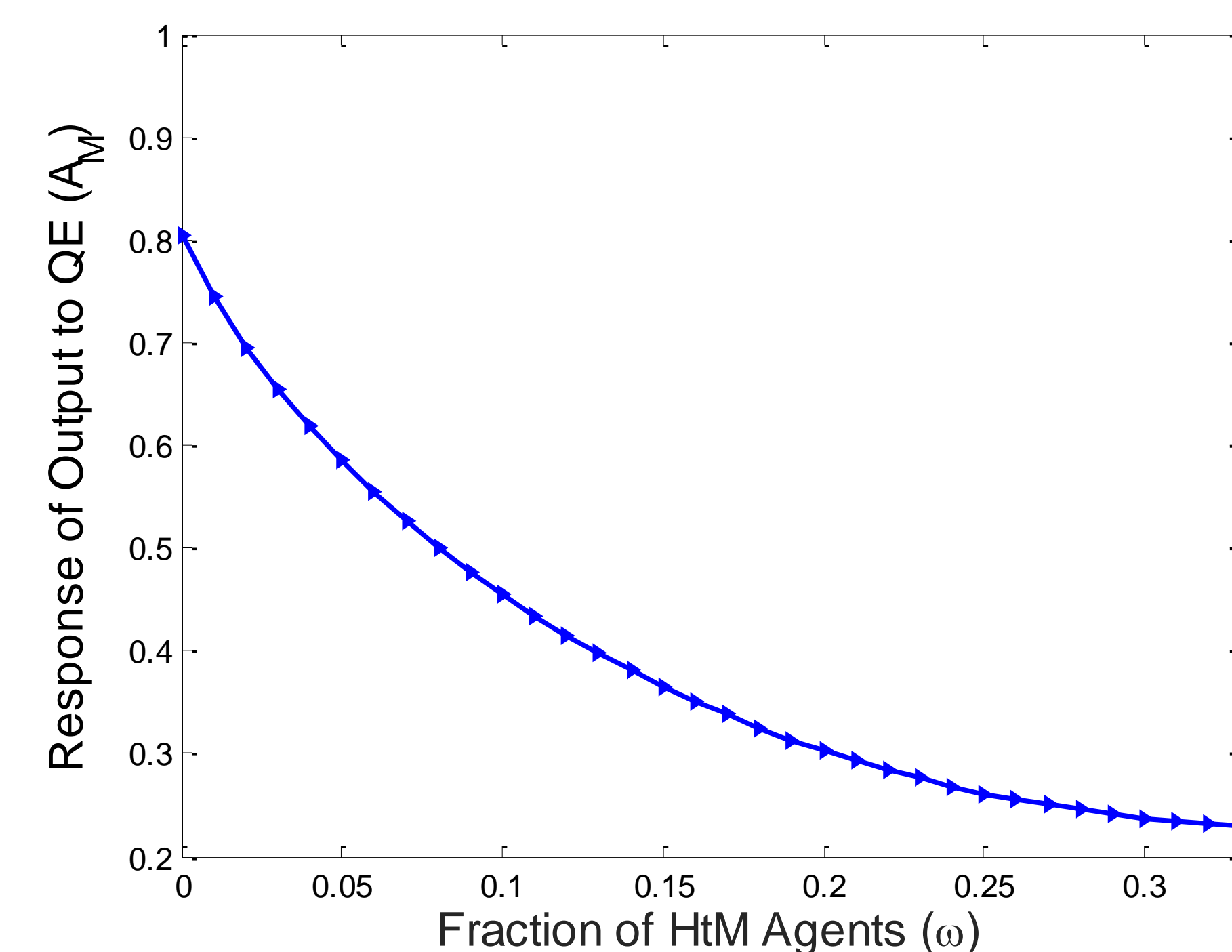


Figure 1: The effectiveness of QE as a function of the share of the constrained households,  $\omega$ . Calculated using Equation (2).

## IMPULSE-RESPONSE FUNCTIONS

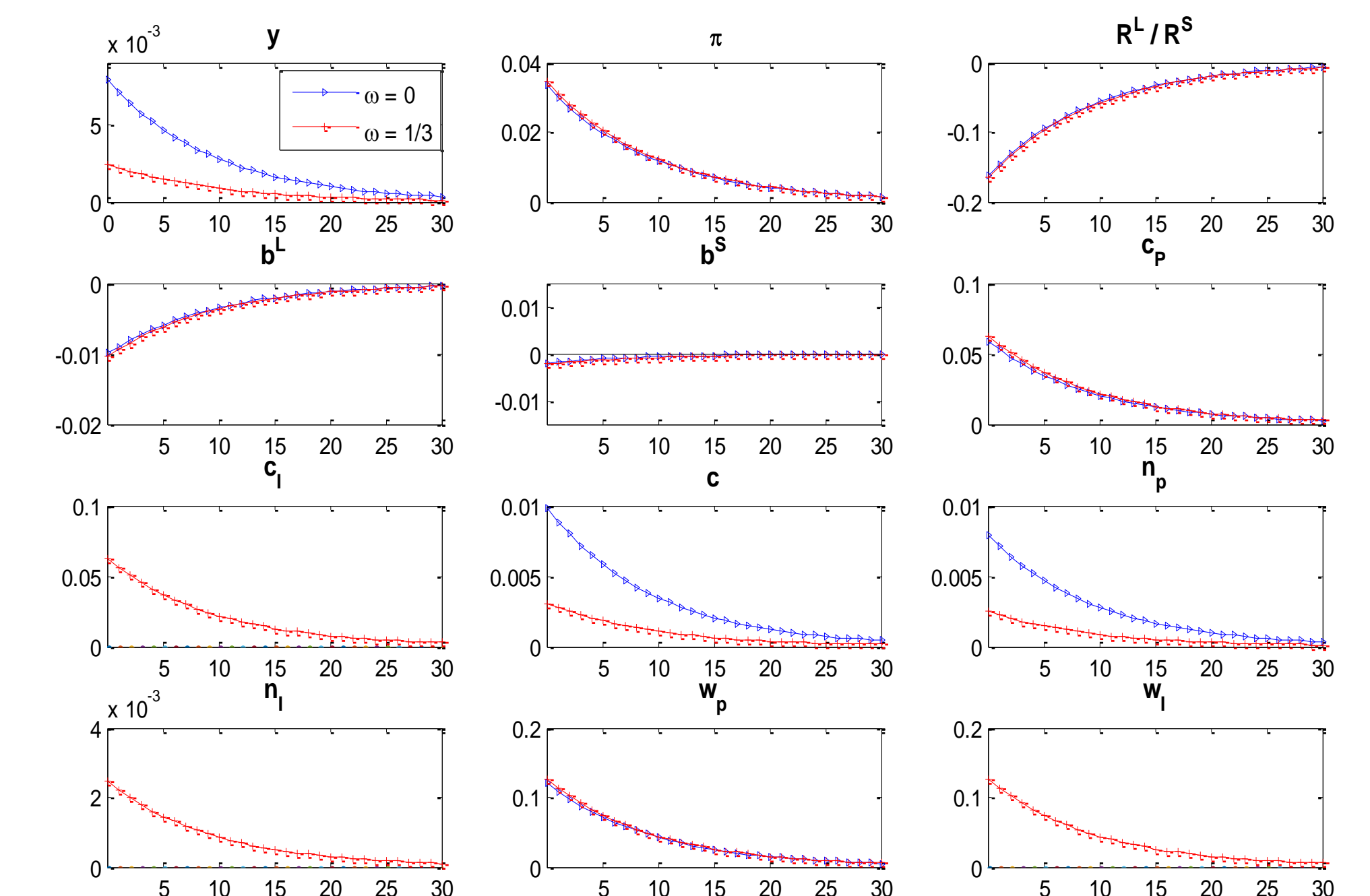


Figure 2: Impulse response of selected variables to a 1% increase in QE asset purchases. The first model ( $\omega = 0$ ) abstracts from HtM households. The second model ( $\omega = 1/3$ ) introduces HtM households.

## CONCLUSION

Credit frictions *reduce* the effectiveness of quantitative easing (via the portfolio rebalancing channel).

## FUTURE RESEARCH

Studying the effects of QE in a model with credit constraints and other transmission channels.

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