Financially constrained consumers and responses to shocks

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Background

- **DSGE models**
  - Dynamic stochastic general equilibrium models
- **Standard assumptions**
  - Infinitely-lived optimising agents
  - Full access to financial markets
  - Consumption smoothing: Permanent income hypothesis
  - Ricardian equivalence

Financial constraints

- **Financially constrained consumers**
  - "Spenders" – Mankiw (AER 2000)
  - "Rule-of-thumb consumers" – Galí, López-Salido and Valles (JEEA 2007)
- **Do not take part in financial and capital markets**
  - Access barred
  - Myopia
  - Impatience
  - Fear

Shocks

- **Fiscal policy shocks**
  - *Furlanetto and Seneca (2008)*
- **Technology shocks**
  - *Furlanetto and Seneca (2007)*
- **Monetary policy shocks**
  - No paper

Optimising households

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{\sigma - 1} \left(C_t^o \right)^{1-\sigma} - \frac{1}{1+\varphi} \left(N_t^o \right)^{1+\varphi} \right]$$

$$s.t.$$

$$P_t \left(C_t^o + I_t + T_t^o \right) + E_t \left(\Lambda_{t,t+1} B_{t+1} \right) + F_t$$

$$= W_t N_t^o + R_t^k K_t + B_t$$

Financially constrained households

- **Follow a rule of thumb: consume current disposable income**
  - No saving
  - Breaks Ricardian equivalence
- **Consumption follows directly from budget constraint**

$$P_t C_t^r = W_t N_t^r - T_t^r - F_t$$

Alternative to PIH

- **Permanent income hypothesis consistently rejected against alternative (e.g. Campbell and Mankiw, 1989):**
  - A fraction *(1-λ)* of consumers are optimisers
  - A fraction *λ* are financially constrained rule-of-thumb consumers
- **Galí, López-Salido and Valles JEEA 2007 first to build into otherwise standard DSGE model**
- **We consider extended version of this model (sticky wages, various real rigidities)**

Log-linearised equations I

- **Household equations**

$$c_t^o = E_t c_{t+1}^o - \sigma^{-1}\left(r_t - E_t \pi_{t+1}\right)$$

$$c_t^r = \frac{WN}{PC}\left(w_t + n_t^r - t_t^r\right)$$

$$c_t = \left(1-\lambda\right)c_t^o + \lambda c_t^r$$

- **...lead to generalised Euler equation**

$$c_t = E_t c_{t+1} - \left(1-\lambda\right)\sigma^{-1}\left(r_t - E_t \pi_{t+1}\right) - \lambda\Theta E_t\left[\Delta\left(w_{t+1} - p_{t+1}\right) + \Delta n_{t+1}\right]$$

Log-linearised equations II

$$\pi_t^p = \beta E_t \pi_{t+1}^p + \kappa_p mc_t$$

$$\pi_t^w = \beta E_t \pi_{t+1}^w + \kappa_w \left(mrs_t - \left(w_t - p_t \right) \right)$$

$$y_t = a_t + \psi k_t + \left(1 - \psi \right) n_t$$

$$k_{t+1} = \left(1 - \delta \right) k_t + \delta i_t$$

$$i = \eta q_t + k_t$$

$$q_t = \beta E_t q_{t+1} - \left(r_t - E_t \pi_{t+1} \right) + \left[1 - \beta \left(1 - \delta \right) \right] E_t \left(r_{r+1}^k - p_t \right)$$

$$r_t^k - p_t = k_t + n_t - \left(w_t - p_t \right)$$

$$y_t = \frac{C}{Y} c_t + \frac{I}{Y} i_t + g_t$$

$$r_t = r + \phi_\pi \pi_t + v_t$$

The government

- **Government spending shocks**

$$g_t = \rho_g g_{t-1} + \varepsilon_g^t$$

- **Partial debt financing**

$$b_{t+1} = \beta\left(b_t + g_t - t_t\right)$$

$$t_t = \phi_b b_t + \phi_g g_t$$

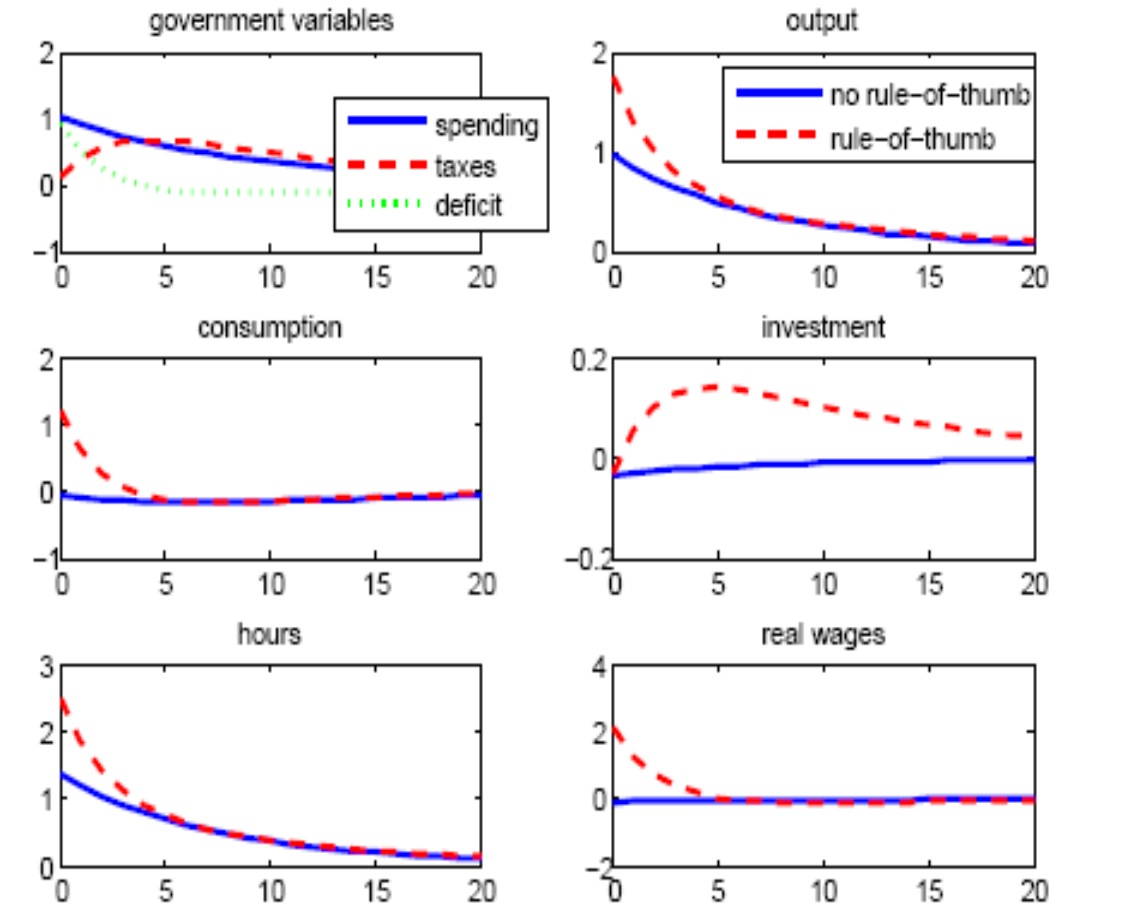
What happens after a government spending shock?

- **Standard DSGE (real business cycle or New Keynesian): G↑ → C↓**
  - Ricardian equivalence and wealth effect (Baxter and King, AER 1993)
  - In contrast with empirical evidence (e.g. Perotti 2008)
- **Galí, López-Salido and Valles JEEA 2007:**
  - Optimising agents: G↑ → C ↓
  - Rule-of-thumb agents: G↑ → C ↑
  - If λ large enough aggregate consumption may rise in keeping with empirical evidence

Furlanetto and Seneca (2008)

- **Results in Galí, López-Salido and Valles JEEA 2007 rely on excessively high fraction of rule-of-thumb households (λ=0.5) and degree of price stickiness (one year expected duration)**
- **Consider more realistic values given recent empirical evidence: λ=0.3 and six months expected price duration**
- **If real rigidities added to model may still obtain empirically plausible consumption multipliers**
  - Habit persistence in consumption
  - Strategic complementarity in price setting (Kimball demand, firm-specific capital)

Responses to gvt. spending shock



Furlanetto and Seneca (2007)

- **Rule-of-thumb consumers substantial deviation from standard DSGE model: what happens after other shocks?**
- **Prominence given to technology shocks since Kydland and Prescott (1982)**
- **Current debate: What happens to hours?**
- **Empirical evidence suggest they fall**
  - Technology shocks cannot be the main driving force behind business cycle fluctuations
- **We show that rule-of-thumb consumers have a contractionary effect that makes it more likely that hours decline following a productivity shock**

How can hours decline in theory?

- **Technology shocks**

$$a_t = \rho_a a_{t-1} + \varepsilon_t^a$$

- **Galí (AER, 1999): Nominal rigidities (sticky prices)**

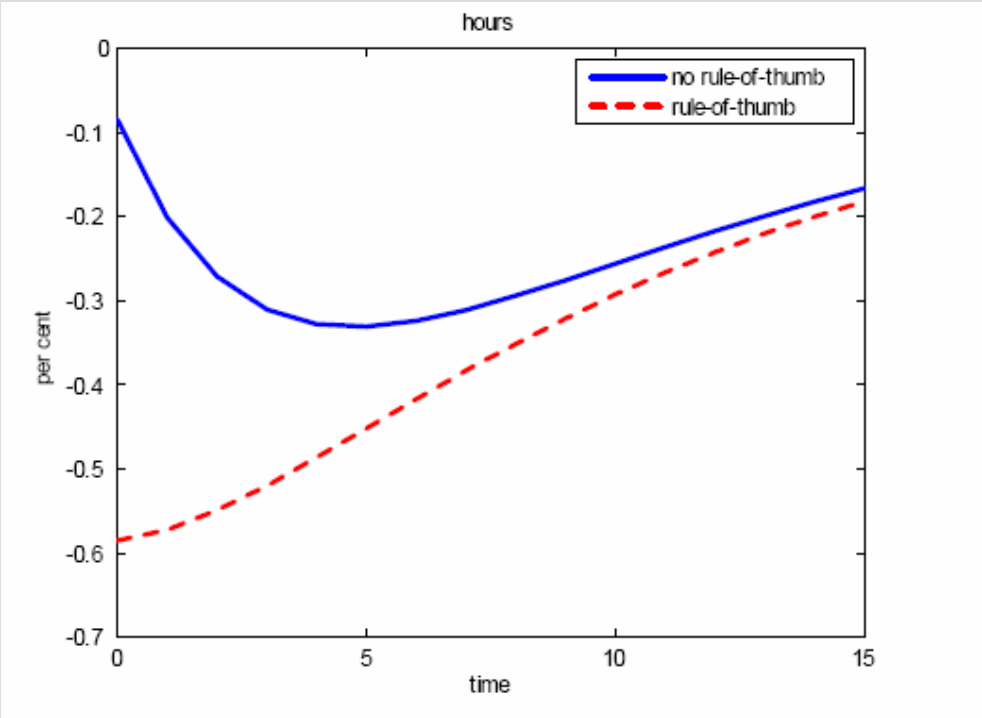
$$m_t - p_t = y_t$$

$$y_t = a_t + n_t$$

- **Francis and Ramey (AER, 2005): Real rigidities (habit persistence and capital adjustment costs)**
- **Galí and Rabanal (2005): Both are important in an estimated model**

Main result

- **Hours decline more after productivity shock with rule-of-thumb behaviour**



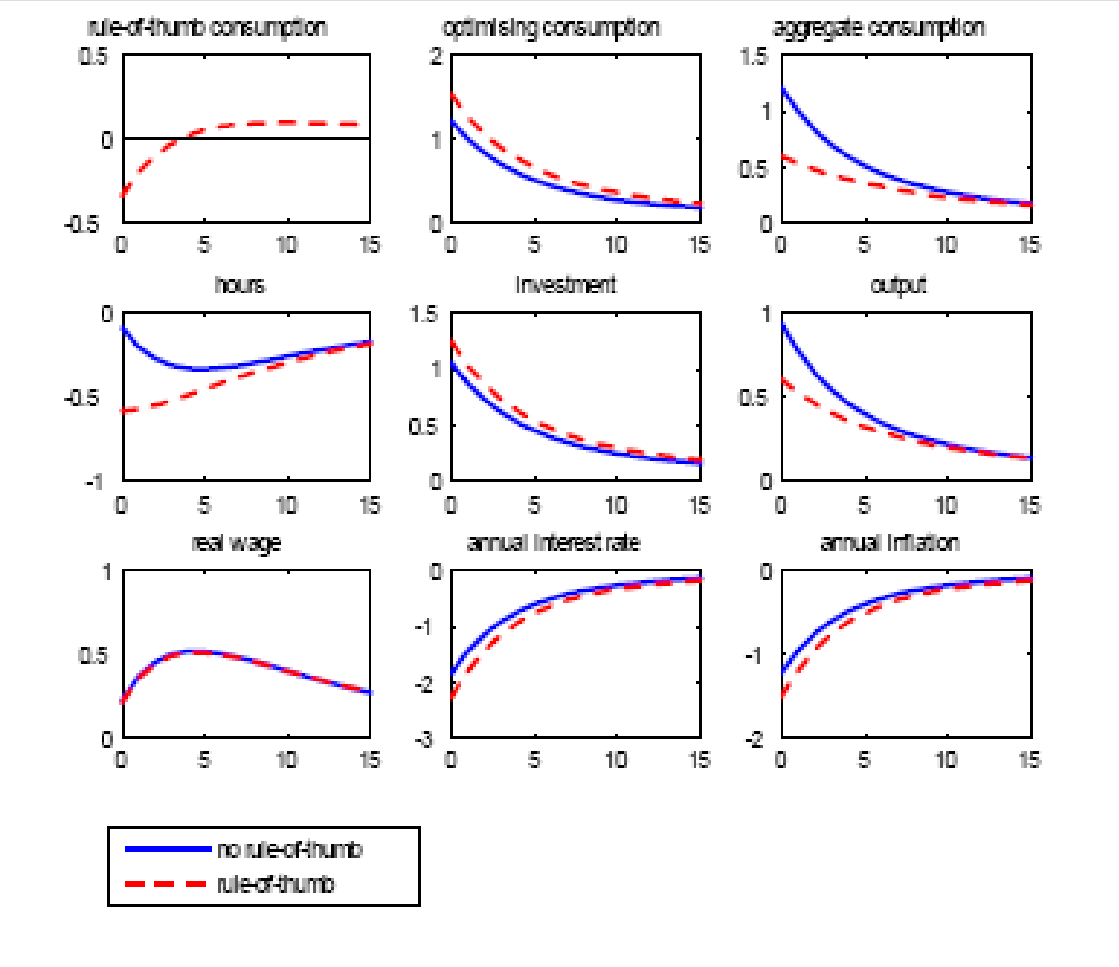
Intuition

- **Positive shock to technology means firms can produce a given level of output with fewer hours**
- **Because prices are sticky, output is determined by demand**
- **Hours will go down if demand does not go up sufficiently**
- **Optimising households consume more**
  - Permanent income effect
  - Interest rate effect
- **Rule-of-thumb households may consume less**

$$C_t^r = \frac{1}{P_t}\left(W_t N_t^r - T_t^r - F_t\right)$$

  - Hours decline because of sticky prices
  - Real wages increase little because of sticky wages
- **Contractionary effect in model when sticky prices and wages**

Responses to technology shock



Monetary policy shock

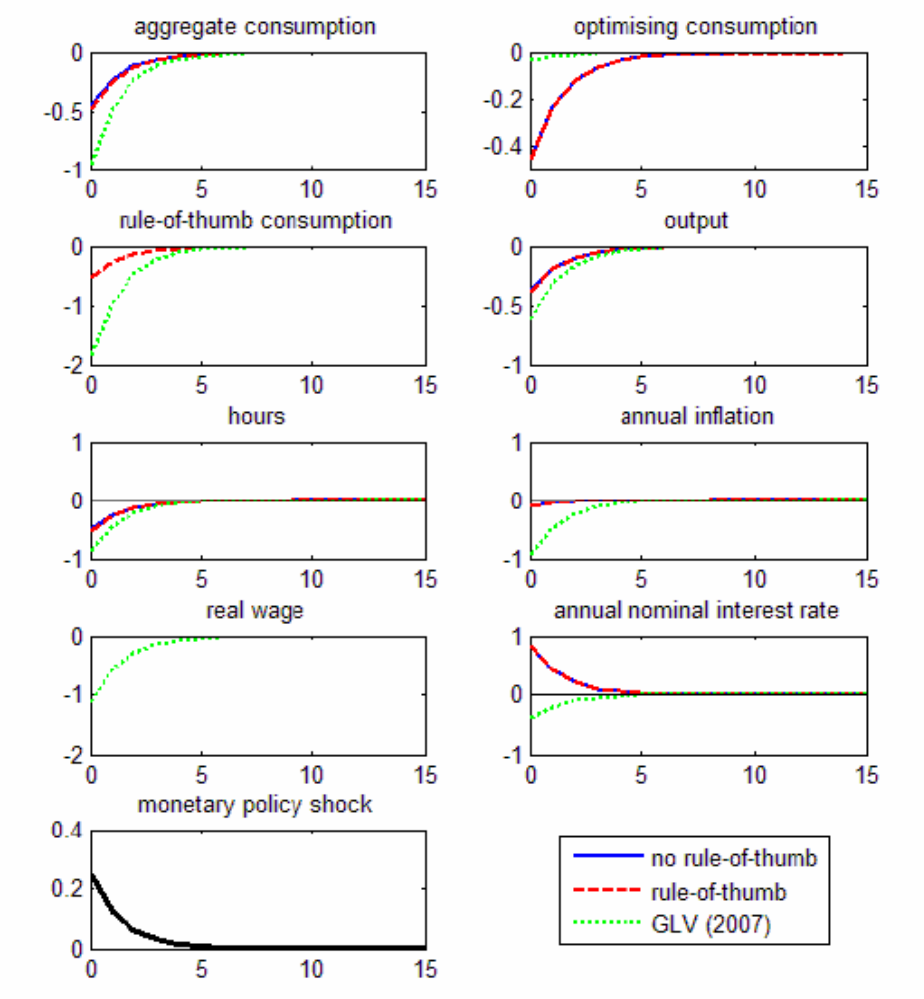
- **Shock to implementation**

$$r_t = r + \phi_\pi \pi_t + \nu_t$$

$$\nu_t = \rho_\nu \nu_{t-1} + \varepsilon_t^\nu$$

- **Flexible wages**
  - Standard New Keynesian DSGE: Positive shock "expansionary" (interest rate declines)
  - Rule-of-thumb behaviour: Exacerbates effect
- **Sticky wages:**
  - Standard New Keynesian DSGE: Positive shock contractionary (interest rate increases)
  - Rule-of-thumb behaviour: No effect (channel closed off)

Responses to monetary shock



Conclusion

- **Objective was to analyse implications of rule-of-thumb behaviour due to financial constraints for responses to shocks (government spending, technology, monetary policy)**
- **Plausible (positive) consumption multiplier after government spending shock for plausible fraction of constrained households (0.3) and degree of price rigidity (six months) *if* real rigidities added**
  - Rule-of-thumb behaviour means to break Ricardian equivalence but cannot stand alone
  - Interactions between nominal, real and financial rigidities are likely to be important
- **Rule-of-thumb behaviour has a contractionary effect that makes it more likely that hours decline after a productivity shock**
  - Less likely that productivity shocks are the main driving force behind business cycle fluctuations given rejection of PIH against this alternative
  - More likely that opposition to technological change if financial constraints and wage rigidity are present
- **Rule-of-thumb behaviour has no significant effect on responses to monetary policy shocks when wages are sticky**
  - Further evidence that wage rigidities are important empirically
- **Next step: Estimation of model framework to sort out relative empirical importance of frictions considered**