Macroeconomic Effects of Debt Relief Policies in Recessions - MPC

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MPC

Achdou et al. (2017) defines MPC as the changes in consumption and saving in response to a windfall increase in available funds *a*.(liquid saving, only asset in their environment)

$$MPC^{\tau}(a,\varepsilon) = dC_a^{\tau}(a,\varepsilon)$$

where

$$C^{\tau}(a,\varepsilon) = \mathbf{E}[c(a_t,\varepsilon_t)dt|a_0 = a, \varepsilon_0 = \varepsilon]$$

MPC is the slope of the consumption function $C^{\tau}(a,\varepsilon)$ which captures the consumption gain (per time unit) after such a windfall over an infinitesimally small time interval.

MPC

Kaplan et al. (2018) generalizes their definition to their two-asset environment.

$$MPC^{\tau}(a, b, \varepsilon) = \frac{\partial C^{\tau}(a, b, \varepsilon)}{\partial a}$$

where

$$C^{\tau}(a, b, \varepsilon) = \mathbf{E}[c(a, b, \varepsilon)dt | a_0 = a, b_0 = b, \varepsilon_0 = \varepsilon]$$

Similarly, the fraction consumed out of x additional units of liquid wealth over a period τ is given by

$$MPC_x^{\tau}(a + x, b, \varepsilon) = \frac{C^{\tau}(a + x, b, \varepsilon) - C^{\tau}(a, b, \varepsilon)}{x}$$

Computing C^τ

C^τ can be computed using the Feynman-Kac formula.
$C^\tau(a, b, \varepsilon) = \Gamma(a, b, \varepsilon, 0)$, where $\Gamma(a, b, \varepsilon, t)$ satisfies the partial differential equation

$$0 = c(a, b, \varepsilon) + \Gamma_a(a, b, \varepsilon, t)\dot{a} + \Gamma_b(a, b, \varepsilon, t)\dot{b} + \sum_{\varepsilon'} \lambda_{\varepsilon\varepsilon'}\Gamma(a, b, \varepsilon, t) + \Gamma_t(a, b, \varepsilon, t)$$

Following this approach, I compute C^{τ} using a PDE.

$C^{\tau}(a, b, \varepsilon, h) = \Gamma(a, b, \varepsilon, h, 0)$, where $\Gamma(a, b, \varepsilon, h, t)$ satisfies the partial differential equation

$$0 = c(a, b, \varepsilon, h) + \Gamma_a(a, b, \varepsilon, h, t)\dot{a} + \Gamma_b(a, b, \varepsilon, h, t)\dot{b} + \sum_{\varepsilon'} \lambda_{\varepsilon\varepsilon'} \Gamma(a, b, \varepsilon, h, t) + \Gamma_t(a, b, \varepsilon, h, t)$$

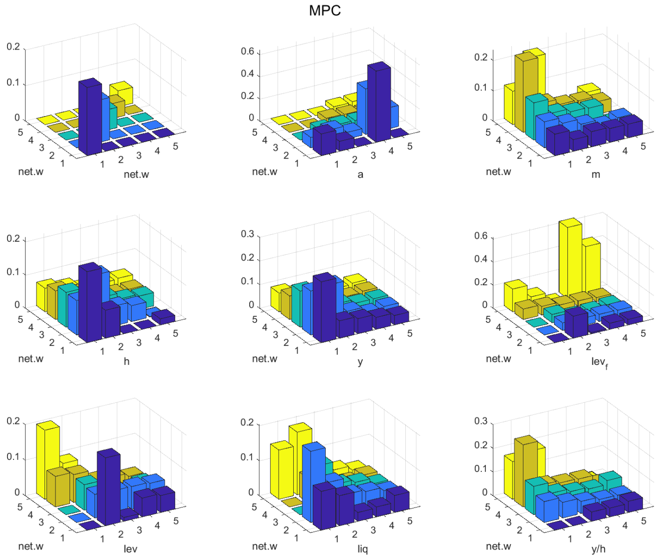
In steady state, $\Gamma_t(a, b, \varepsilon, h, t) = 0$

MPC

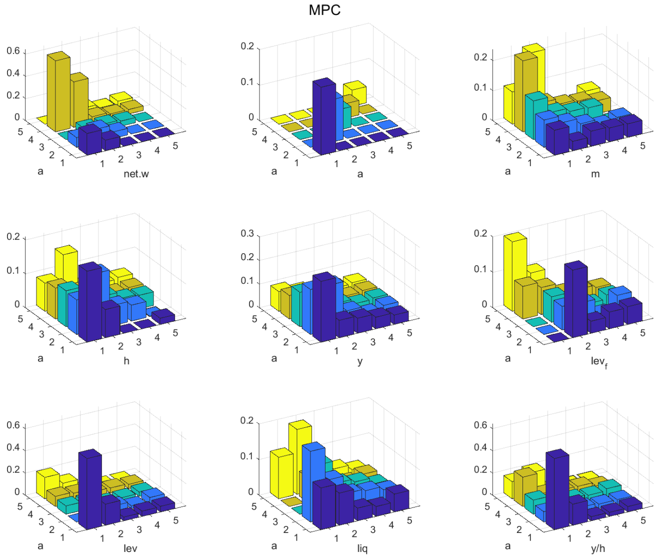
Plot MPC over quintiles

$net.w$	net worth
a	liquid asset
m	mortgage
h	house
y	income
lev_f	(mortgage+unsecured debt)/saving
lev	(mortgage+unsecured debt)/(saving+house)
liq	liquid asset/(saving+house)
y/h	income/house

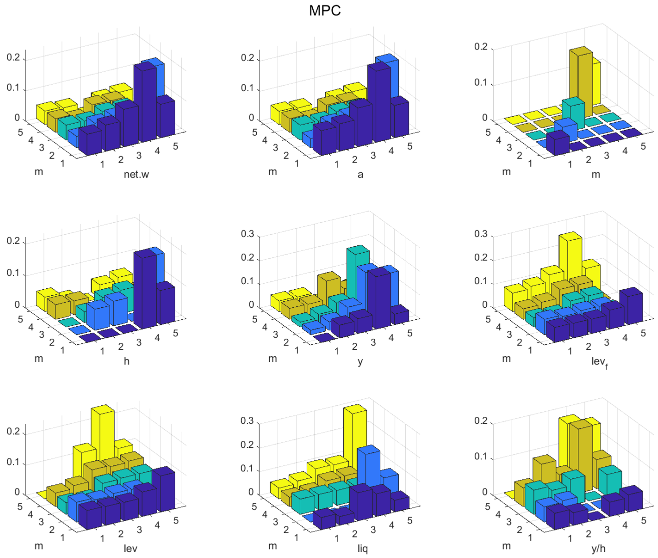
Net worth


MPC
0.2
0.1
0
net.w
net.w
0.6
0.4
0.2
0
net.w
a
0.2
0.1
0
net.w
m
0.2
0.1
0
net.w
h
0.3
0.2
0.1
0
net.w
y
0.6
0.4
0.2
0
net.w
lev_f
0.2
0.1
0
net.w
lev
0.2
0.1
0
net.w
liq
0.3
0.2
0.1
0
net.w
y/h

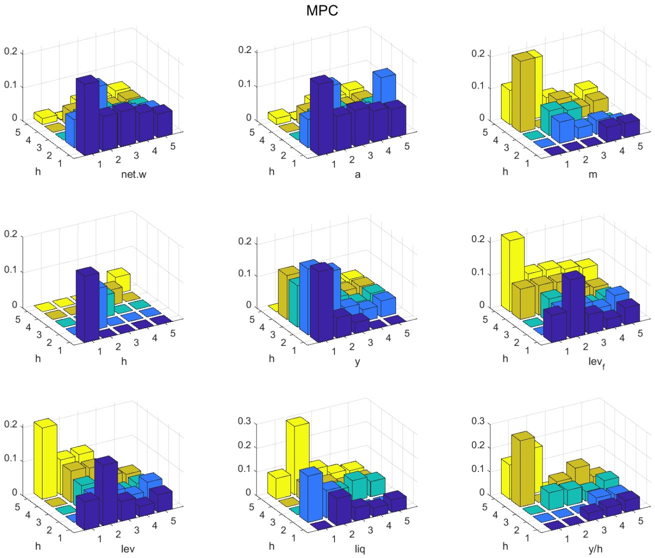
liquid asset



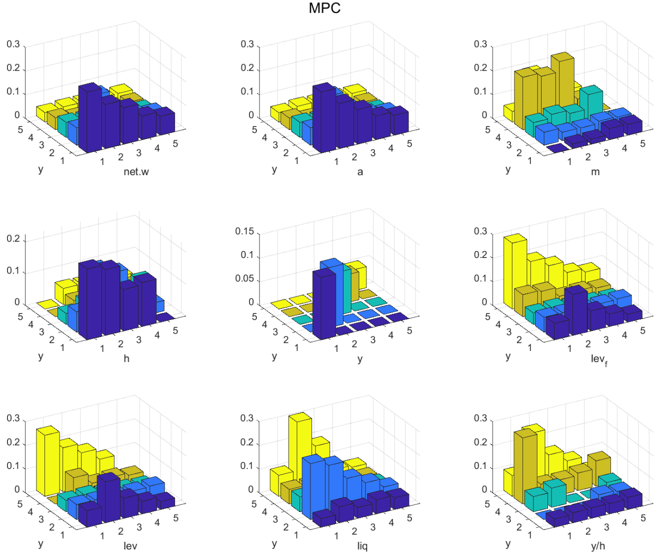
mortgage



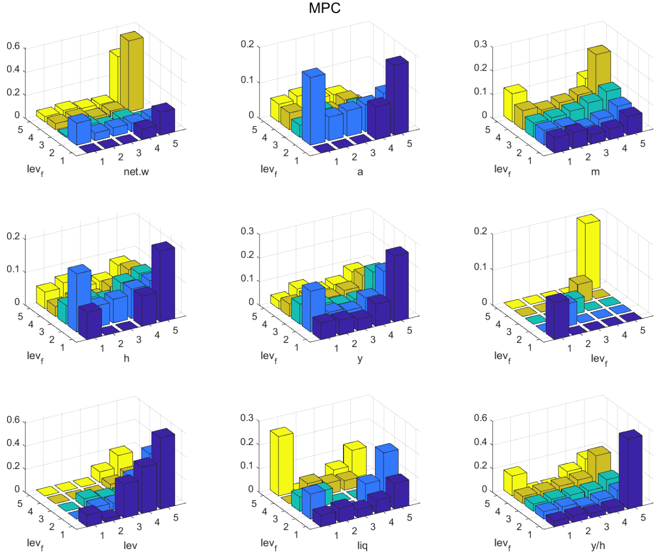
house



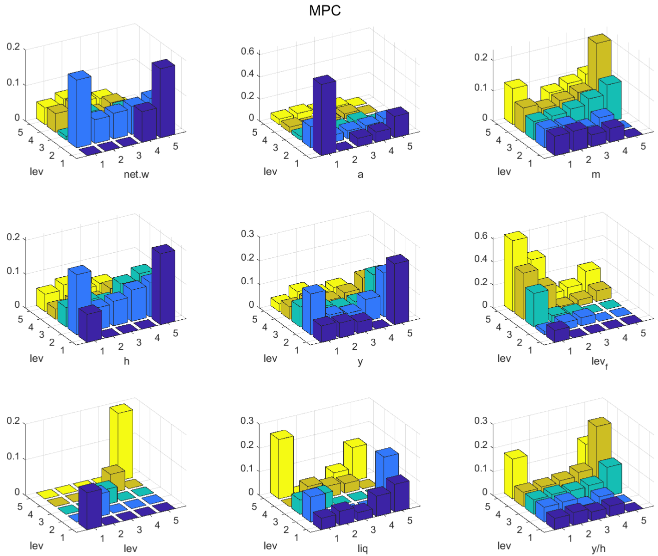
income



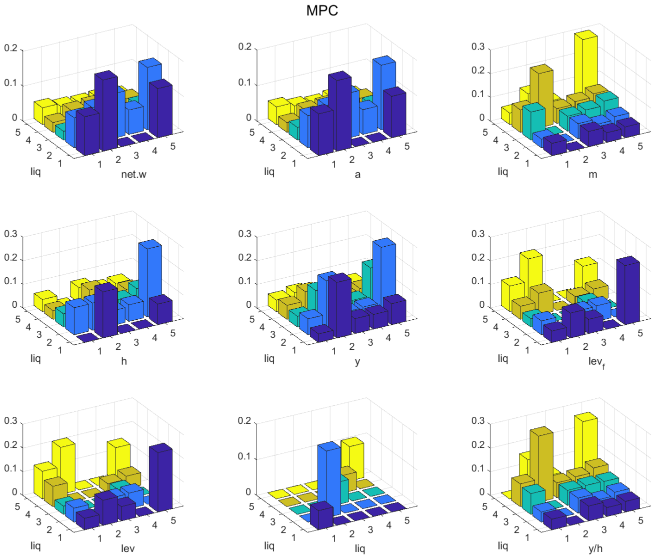
(mortgage+unsecured debt)/saving



(mortgage+unsecured debt)/(saving+house)



liquid asset/(saving+house)



income/house