A Model of the Consumption Response to Fiscal Stimulus Payments

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Working Paper

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Motivation

- **Fiscal stimulus payments** (tax rebates)
  - Typically small, anticipated, temporary, lump-sum.
  - Households spend $20-40\%$ of tax rebates on non-durable consumption in the quarter they receive it.

- It is difficult to replicate this observation with:
  - A standard life-cycle model
  - A standard (life-cycle) Bewley model

- A **Baumol-Tobin** money-demand model in a **life-cycle incomplete-market** economy:
  - Agents can invest both in a liquid asset and an illiquid asset
  - The illiquid asset has higher return but a transaction cost

$\Rightarrow$ Generates two types of constrained households

The 2001 Tax Rebate

Economic Growth and Tax Relief Reconciliation Act (May 2001)

- An average decrease of 3% of the marginal income tax rate
- Changes gradually phased in over 2002 – 2006, "sunset" in 2011
- Advance refund:
  - Announced in June, checks sent July-September 2001
  - Sequence based on the two digits of SSN
  - 92 million taxpayers received a rebate check, with 72 million receiving the maximum amount ($600 for married couples)
- Total payout was $38b: 1.7% of quarterly Y
- Recession

Johnson, Parker and Souleles (2006, 2009)

- Consumer Expenditure Survey
- Additional question about the timing and amount of the rebate check

The response of consumption to tax rebates (JPS)

Estimation:

$$\Delta c_{it} = \sum_s \beta_{0,s} \text{month}_s + \beta_A X_{i,t-1} + \beta_2 R_{i,t} + \epsilon_{i,t} \quad (1)$$

where $\Delta c_{i,t}$ is the change in nondurable expenditures, $X_{i,t-1}$ a vector of demographics, $R_{i,t}$ the dollar value of the rebate

$=>$ β_2 is the "rebate coefficient"

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Results:

- Rebate coefficient β_2 between 0.2 and 0.4
- β_2 is **not equal to the** *MPC*

To generate a large value for β_2, a model must feature at the same time:

- A large MPC out of transitory shocks
- A low MPC out of the news of the shock

Environment

- Continuum of households indexed by i: work for J^w periods, live as retiree for J^r periods.

- **Preferences:** $\mathbb{E}_0 \sum_{j=1}^{J} \beta^j \frac{c_{ij}^{1-\gamma}-1}{1-\gamma}$ (exogenous labor supply)
- **Earnings:** $\log y_{ij} = \chi_j + \alpha_i + z_{ij}$ when working, $p(Y_{J^w})$ retired
- Two assets:
  - *Liquid* asset $m_{ij} \geq 0$ with return $R^m \equiv \frac{1}{q^m}$
  - *Illiquid* asset $a_{ij} \geq 0$ with return $R^a \equiv \frac{1}{q^a} > R^m$ and transaction cost κ

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- Government budget constraint:

$$G + \sum_{j=J^w+1} p(Y_{Jw}) d\mu_j + \left(\frac{1}{q^g} - 1\right) B = \tau^c \sum_{j=1}^{J} \int c_j d\mu_j + \sum_{j=1}^{J} \mathcal{T}(y_j, a_j, m_j) d\mu_j$$

- No aggregate uncertainty

Value functions

+ **State**: $s_j = (a_j, m_j, \alpha_j, z_j)$.
+ **Value function**: $V_j(s_j) = \max\{V_j^0(s_j), V_j^1(s_j)\}$

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If not adjusting the illiquid asset:

$$V_j^0(s_j) = \max_{c_j, m_{j+1}} u(c_j) + \beta \mathbb{E}_j V_{t+1}(s_{j+1}) \quad \text{s.t.} \tag{2}$$

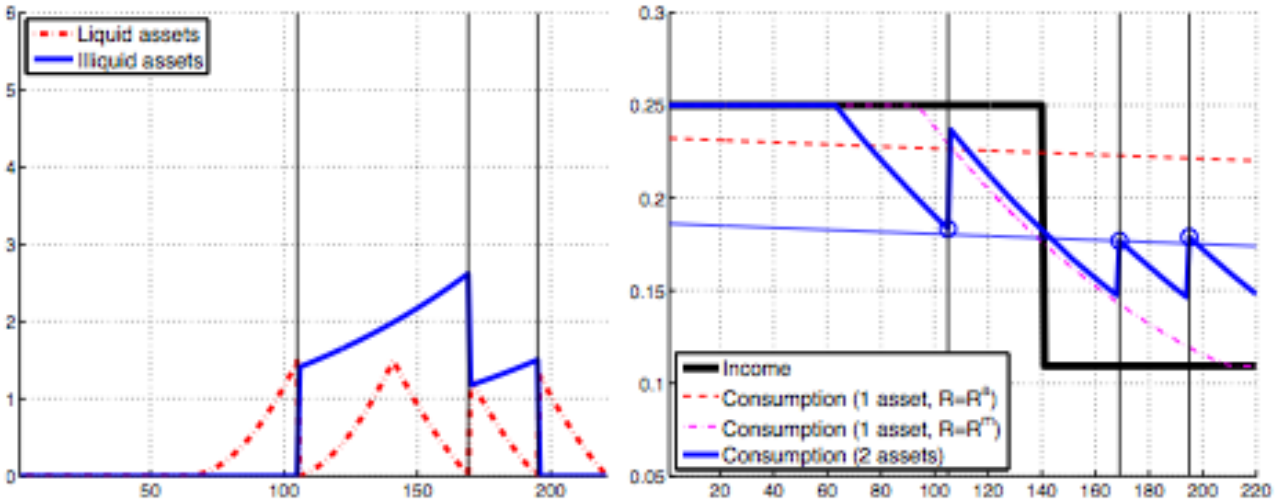
$$q^m m_{j+1} + (1+\tau^c)c_j = y_j(s_j) - \mathcal{T}(s_j) + m_j$$
$$q^a a_{j+1} = a_j$$
$$m_{j+1} \geq 0$$

If adjusting the illiquid asset:

$$V_j^1(s_j) = \max_{c_j, m_{j+1}, a_{j+1}} u(c_j) + \beta \mathbb{E}_j V_{t+1}(s_{j+1}) \quad \text{s.t.} \tag{3}$$

$$q^m m_{j+1} + q^a a_{j+1} + (1+\tau^c)c_j = y_j(s_j) - \mathcal{T}(s_j) + m_j + a_j - \kappa$$
$$a_{j+1} \geq 0, \quad m_{j+1} \geq 0$$

A deterministic example



(a) Lifecycle asset accumulation (b) Lifecycle income and consumption path

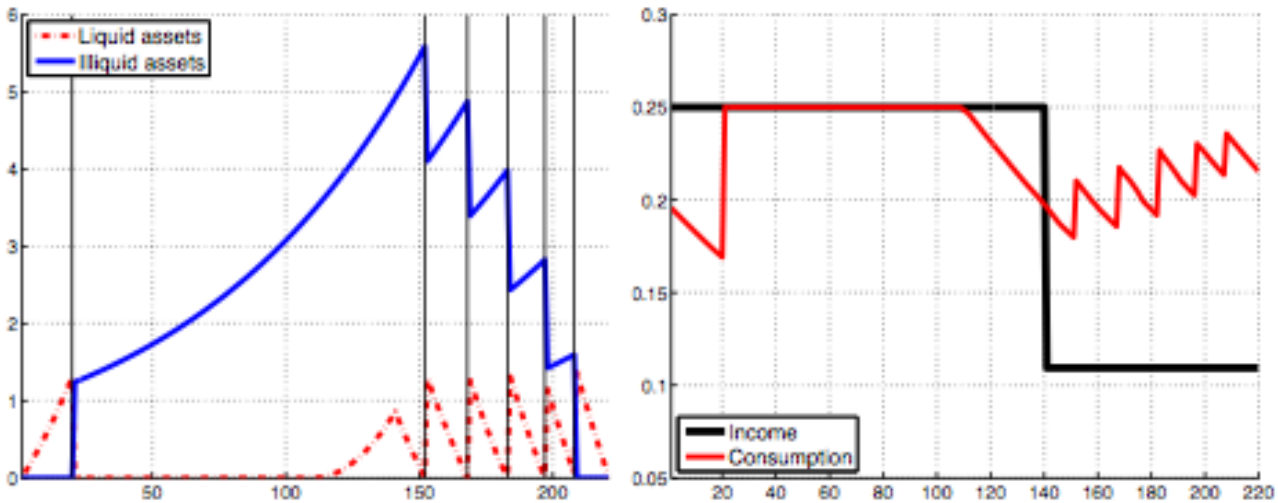
+ EE of a working household, who is unconstrained and does not adjust:

$$u'(c_j) = \beta R^m u'(c_{j+1})$$

+ EE between two adjustment dates j and $j+N$:

$$u'(c_j) = (\beta R^A)^N u'(c_{j+N})$$

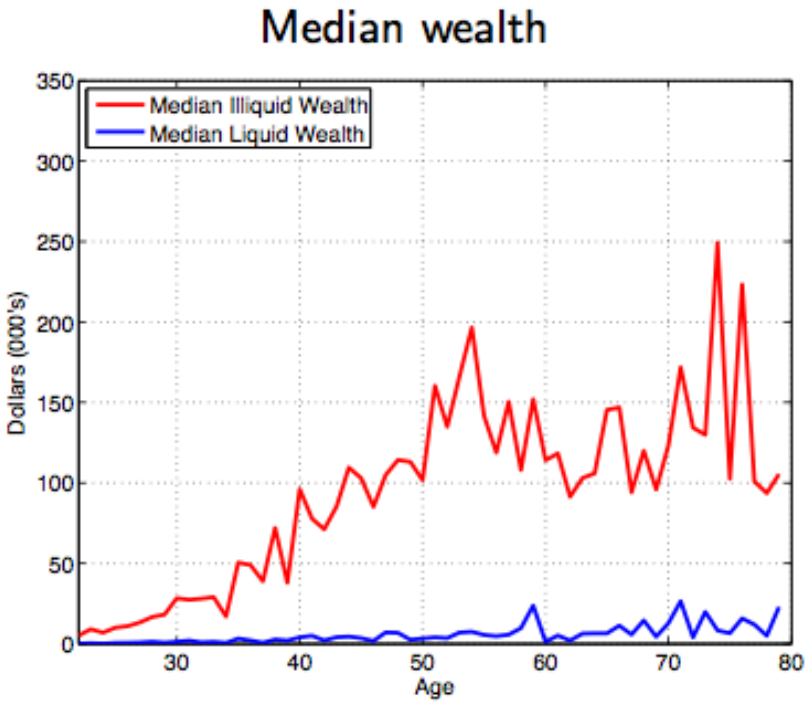
A deterministic example (with a higher R^a)

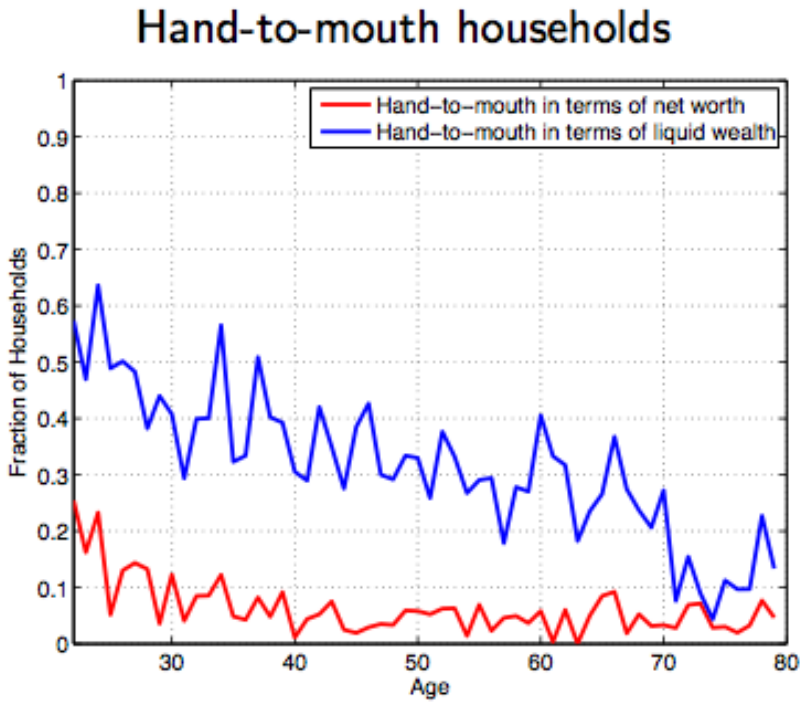


(a) Lifecycle asset accumulation (b) Lifecycle income and consumption path

Lifecycle of a wealthy "hand-to-mouth" agent in a two-asset model

Distribution of liquid and illiquid wealth (SCF 2001)





+ Median liquid assets: $\$2,700$; Median illiquid assets: $\$70,000$.

+ 6% hand-to-mouth in net worth; 30% in liquid wealth.

Calibration

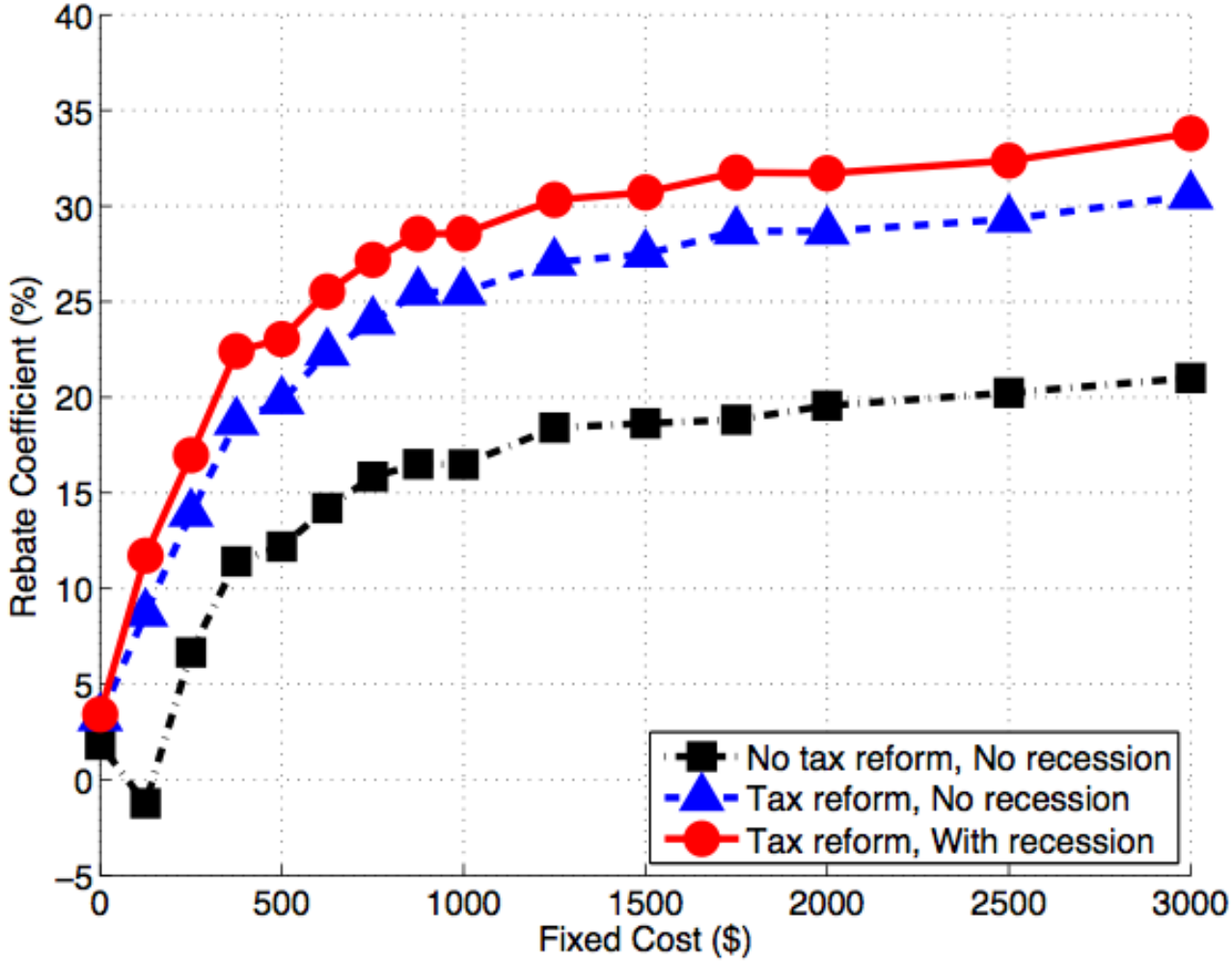
Quarterly model

- **Demographics**: $J^w = 38$, $J^r = 20$.
- **Preferences**: $\gamma = 1$, β to match the median illiquid wealth in *SCF*
- **Earnings heterogeneity** (*PSID* 1969-96) to match level and growth of earnings inequality
- **Initial Asset Position**: SCF 2001
- **Asset returns** (micro data 1960-2009): $R^m = -1.1\%$, $R^a = 6.2\%$.
- **Government**: Expenditures, tax system and SS system US 2001.

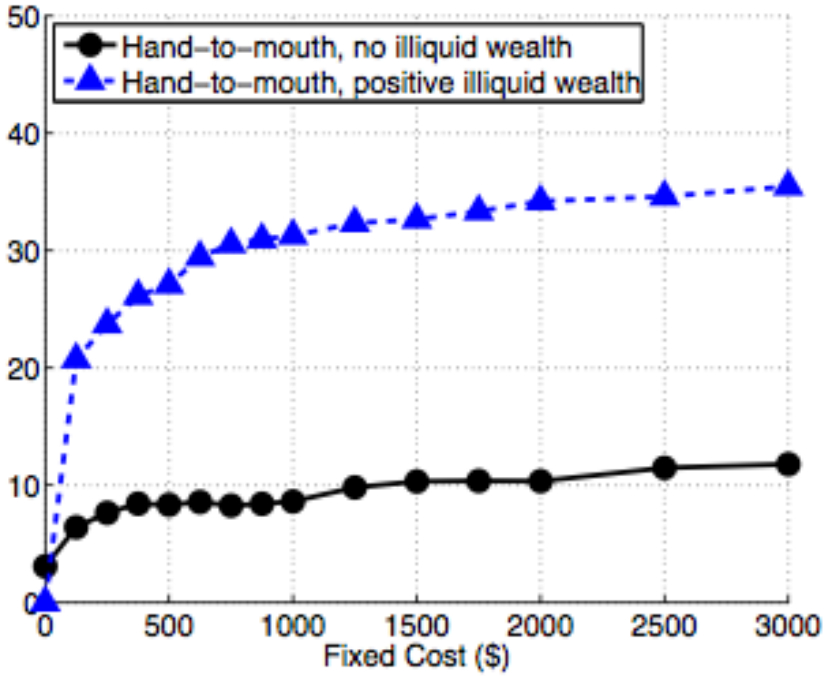
Description of the experiment

- In quarter $t = 0$, the government announces a **tax rebate** of \$500 paid out at $t = 0$ (group A) or $t = 1$ (group B)
- After 10 years, permanent additional proportional earning tax
- Additional *environment changes* in 2001:
  - Bush tax cuts (with expected sunset or not)
  - 2001-2002 recession

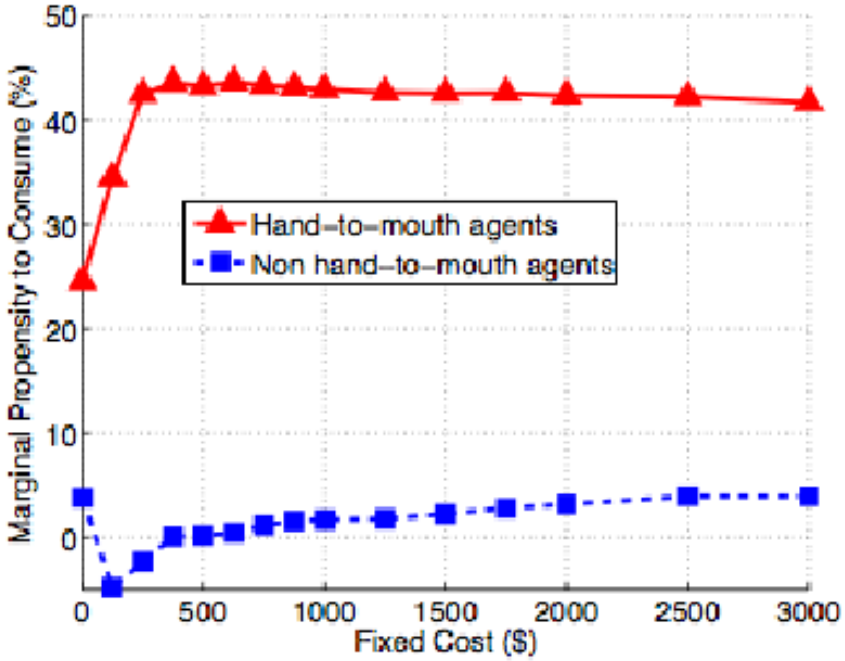
Rebate coefficient in the model



Hand-to-mouth households

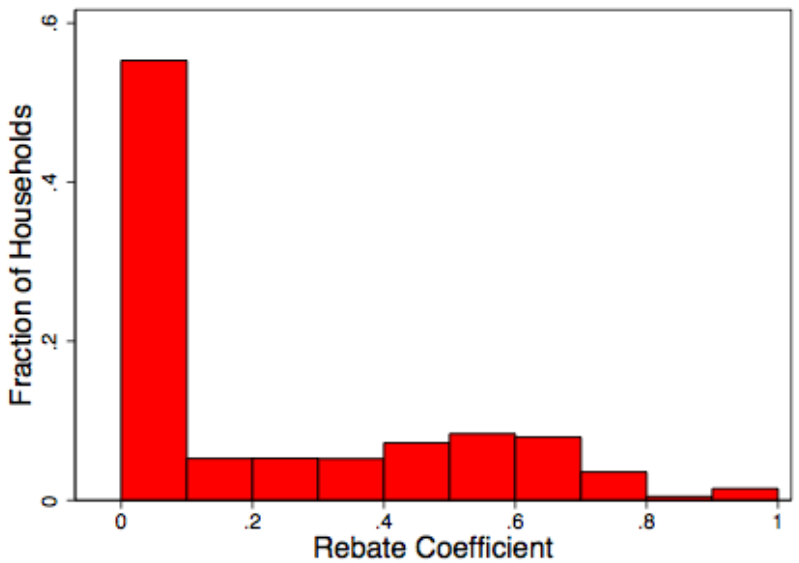


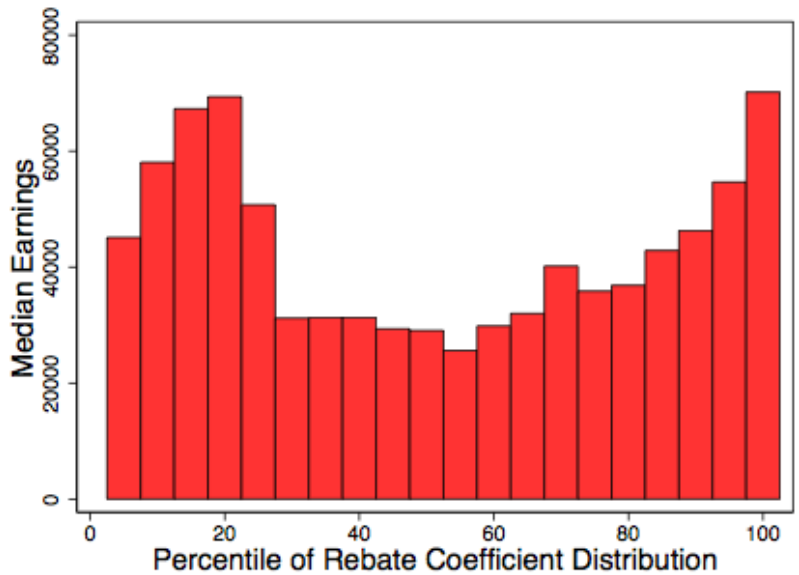
(c) Fraction of hand-to-mouth households



(b) Average marginal propensity to consume

Heterogeneity in rebate coefficients





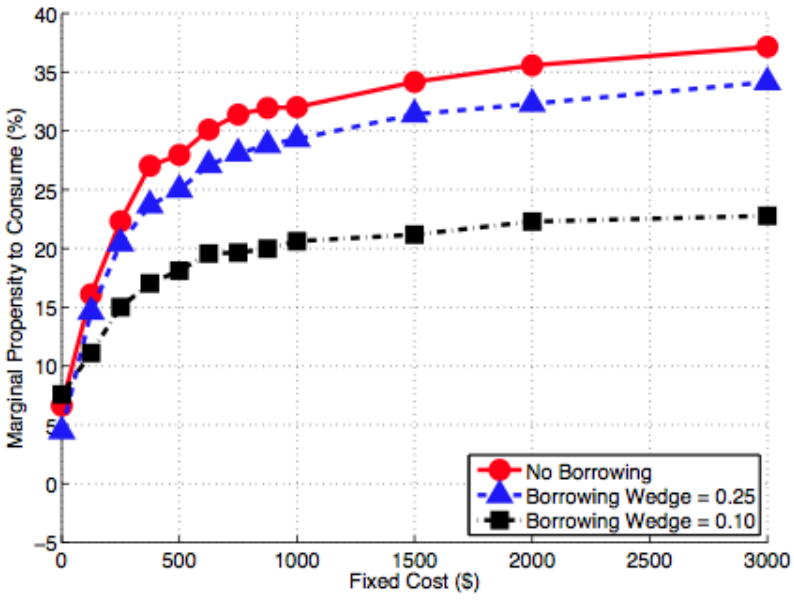
Robustness Checks

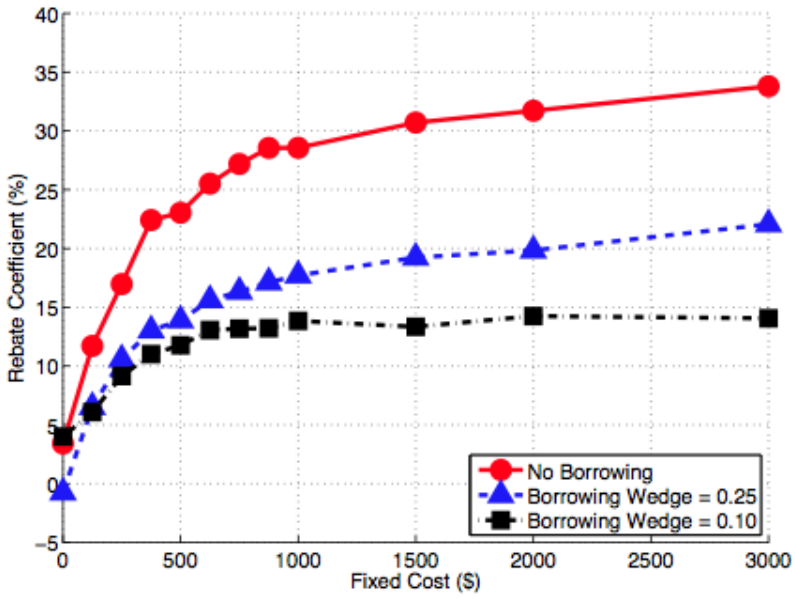
- Timing of announcement
- Transaction costs
- Sunset

- Credit
- Size of the rebate

- Matching distribution of wealth?

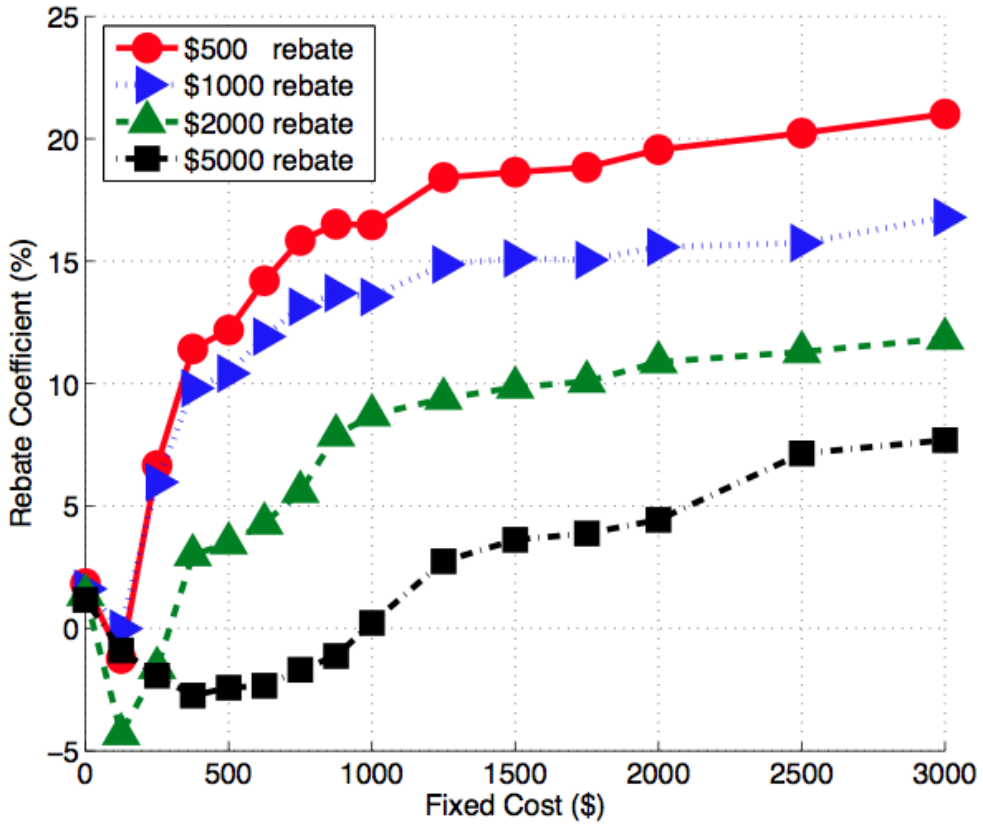
Credit





- If agents can borrow against a transitory shock, MPC could be smaller
- If agents can borrow at the news of the rebates, rebate coeff could be smaller

Size of the rebate



A large rebate decreases the rebate coefficient:

- Loosens the budget constraint
- Some agents pay the transaction cost and reduce consumption

Conclusion

- A model able to generate large responses to fiscal stimulus payments - both in terms of MPC and in terms of rebate coefficient.
- Could be used to address the 2008 episode of fiscal stimulus payments?
  - Empirical evidence: rebate coefficients are between half and 2/3 of the size of the 2001 estimates.