

# ECOM181 Macroeconomics for Policy

2022/23 Semester 1

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# Plan for today

- Measure of the size of household consumption responses to cash handouts
- Consumption responses to different types of income changes and differences across different household types
- 2001 Tax rebates

# Questions to discuss

- What is the measure of the size of household consumption responses to cash handouts?
- How and why do consumption responses vary across different household types?
- How would you assess the potential impact of cash transfer programmes and what is the difficulty of doing so based on past experiences?

# Questions to discuss

- What is the measure of the size of household consumption responses to cash handouts?

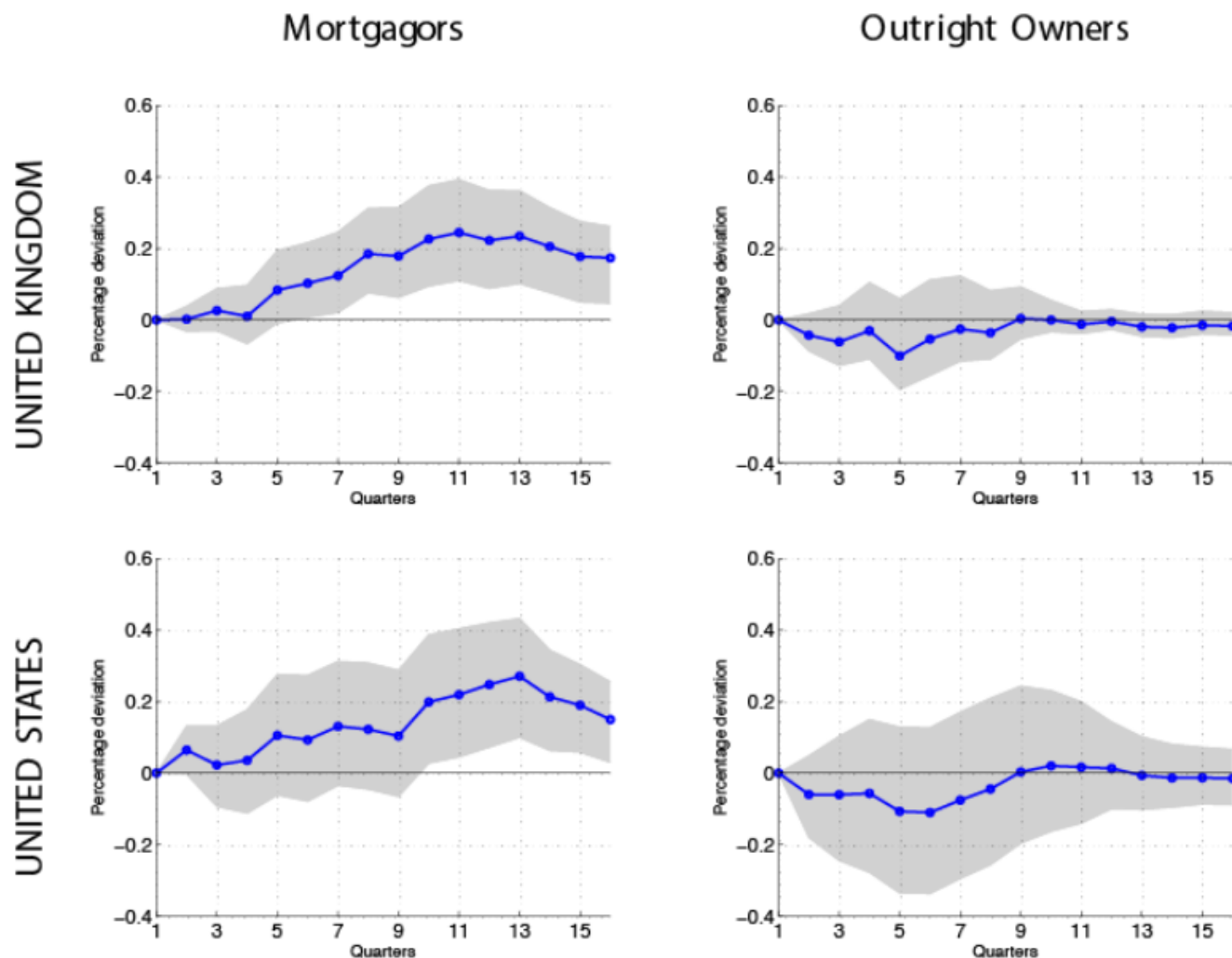
# Questions to discuss

- What is the measure of the size of household consumption responses to cash handouts?
- → Marginal propensity to consume (MPC)

# Questions to discuss

- How and why do consumption responses vary across different household types?

# Last week: Response non-durables to interest rate cut

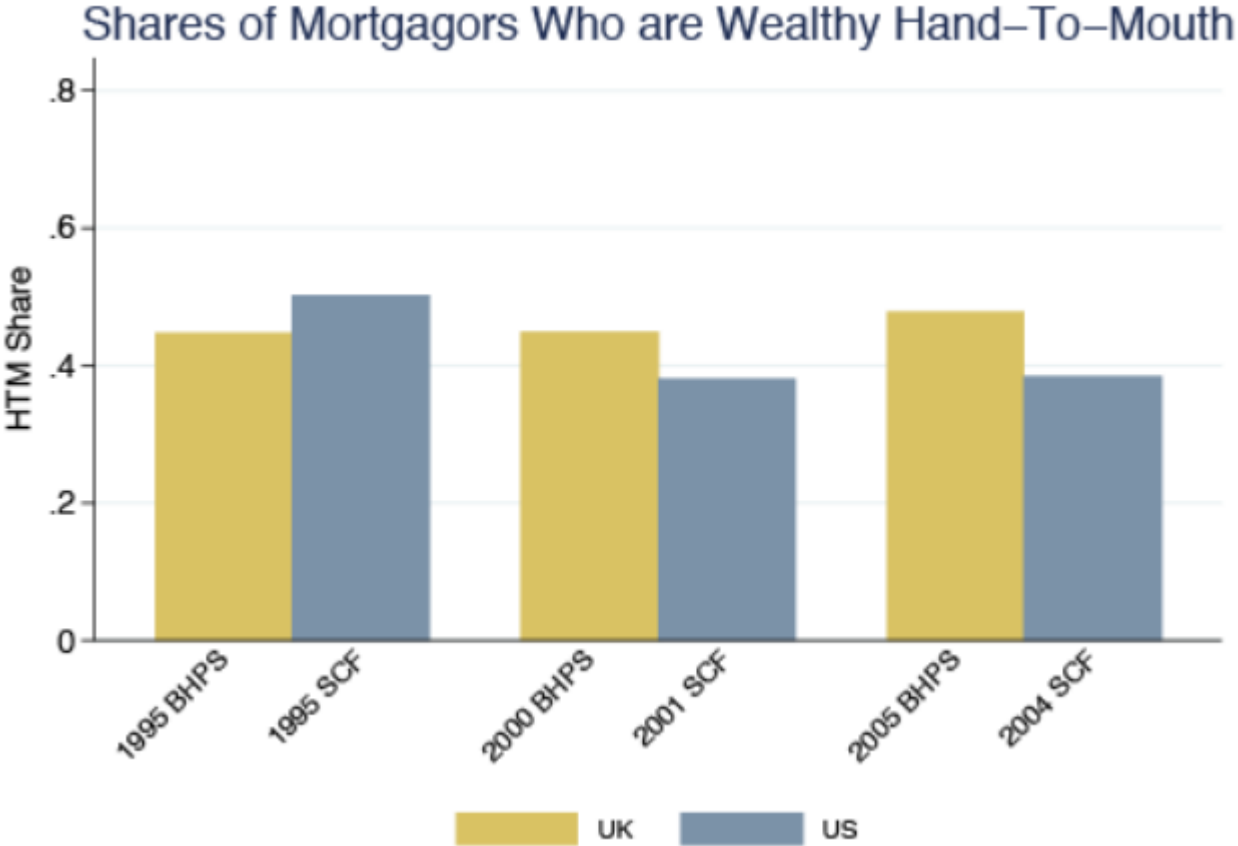


# Last week: Mortgage debt and MPC

- So do households with mortgages spend more because they have a higher income increase?
  - Not really. The income increases is largely caused by general equilibrium effects (e.g. real interest rate channel on investment)
    - Income rises by around \$700 (UK) and \$760 (US) for mortgagors
    - Income also rises considerably for outright owners: \$450 (UK) and \$585 (US)
  - The difference in spending cannot be explained by these relatively small income differences
  - Instead, mortgagors spend a larger proportion of their additional income
- Higher marginal propensity to consume (MPC)  $\frac{dc}{dY}$



# Last week: Large shares of liquidity constrained households with high MPC

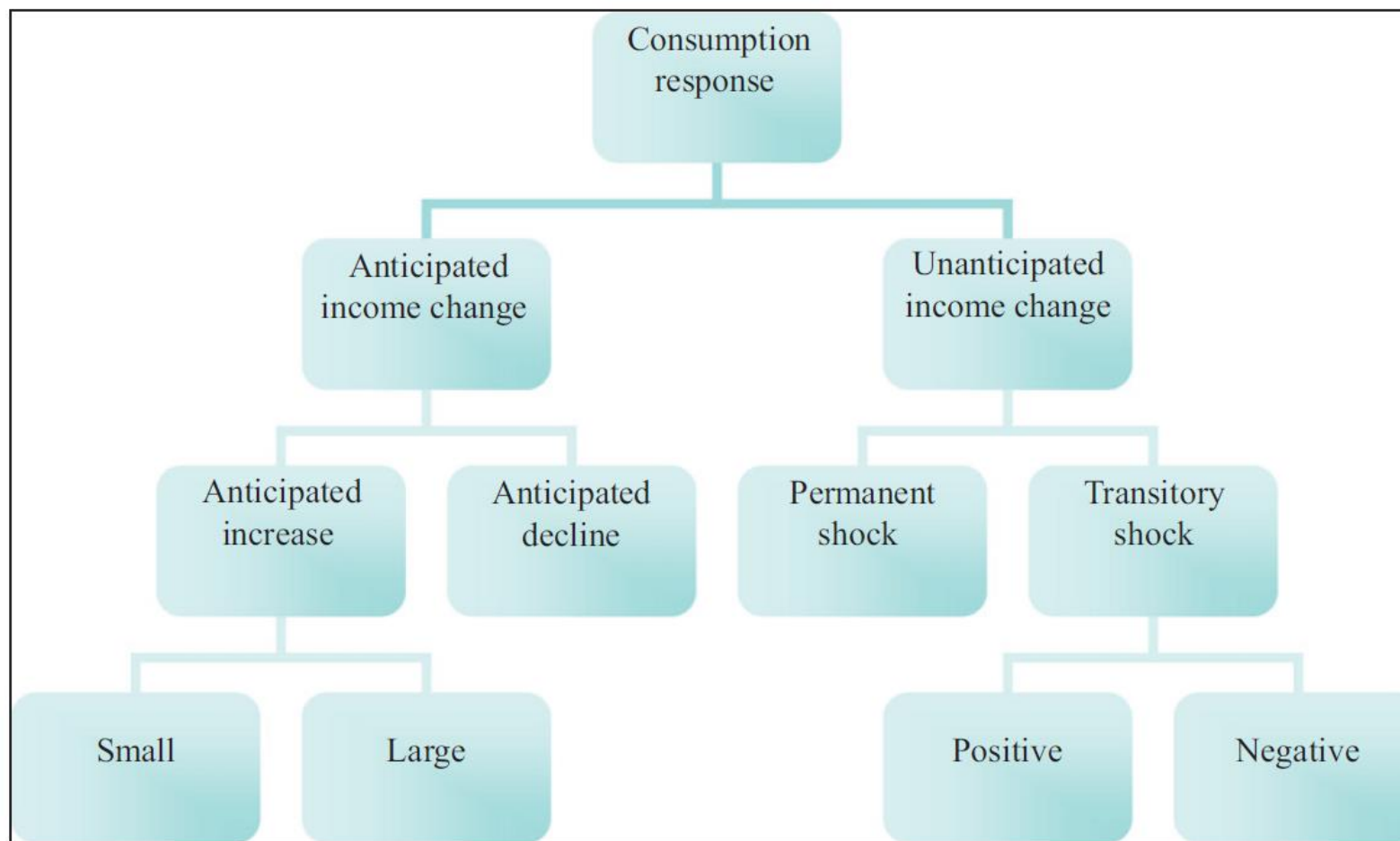


# The consumption response to income changes

Jappelli, Tullio and Pistaferri, Luigi, 2010.

*Annual Review of Economics*, Vol. 2: 479-506

# Different type of income changes can give different responses



# Unanticipated income changes

- Does household consumption respond to unexpected income changes?

# Theory – PIH

$$\frac{1}{r}c_t = A_t + \frac{1}{1+r} \sum_{i=0}^{\infty} \left(\frac{1}{1+r}\right)^i E_t[y_{t+i}]$$

$$c_t = r[A_t + H_t] = y_t^p$$

- Yes, consumption depends on expected future income
  - Unexpected changes in income hence lead to changes in consumption
- If the income shock is transitory, the effect should be very small
- A permanent income shock should have a one-for-one impact on consumption

# Empirical framework

$$\Delta c_{it} = \alpha E_{t-1} \Delta y_{it} + \gamma z_{it} + \sum_{k=1}^K \varphi^k \pi_{it}^k + \xi_{it}$$

- $\pi$  are different components of the income process
  - This allows for income shocks with different degrees of persistence
- With the  $\varphi$  parameters, one can estimate the marginal propensity to consume with respect to income shocks

# Empirical findings

- In line with theory, there are much larger consumption responses to permanent shocks than to transitory shocks
- Several studies find however that the response to a permanent shock is considerably lower than 1.
  - E.g., Blundell et al. (2008)
- This suggests that households were able to insure (or anticipate) permanent shocks to their income
- Further, households that are likely to be liquidity constraint (e.g. low asset holdings) are found to also respond considerably to negatives transitory shocks.
  - E.g., Browning & Crossley (2001b)

# Explaining empirical findings

- Kaplan&Violante (2010) have a model with precautionary savings and liquidity constraints that can rationalize all three findings.
- Consumers who can freely borrow and save are able to
  - smooth transitory shocks to a large extent (the marginal propensity to consume out of a transitory income shock is 0.05)
  - and also somewhat permanent shocks, but to a much lower extent (the marginal propensity to consume out of a permanent shock is 0.77).
- When consumers are unable to borrow, both marginal propensities to consume increase considerably (to 0.18 and 0.93, respectively).



# Anticipated income changes

- Does household consumption respond to changes in income that are anticipated?

# Theory – PIH

$$u'(c_{it-1}) = (1 + \delta)^{-1} E_{t-1}[(1 + r_t)u'(c_{it})],$$

$$E_{t-1}u'(c_{it}) = u'(c_{it-1}).$$

- PIH says no
- There is a consumption plan that smooths out changes in income over the life-cycle
- Only unexpected changes in income lead to adjustments to this consumption plan and hence to changes in consumption

# Empirical framework

$$\Delta c_{it} = \alpha E_{t-1} \Delta y_{it} + \gamma z_{it} + \sum_{k=1}^K \varphi^k \pi_{it}^k + \xi_{it}$$

- With  $\alpha$ , one can test if *expected income growth does not affect consumption growth*.

# Empirical findings

- Does household consumption respond to changes in income that are anticipated?
- Empirically, consumption does respond to anticipated income changes
- This might be caused by households being liquidity constrained.
  - When you anticipate an income increase, PIH says you should already start consuming more today
  - But due to borrowing/liquidity constraints, this may not be feasible
- Empirical findings support this theory

“Consumption appears much less responsive to anticipated income declines (for instance, after retirement), a case in which liquidity constraints have no bearing.”

- Shea (1995), Garcia et al. (1997), and Jappelli & Pistaferri (2000)

# Questions to discuss

- How would you assess the potential impact of cash transfer programmes and what is the difficulty of doing so based on past experiences?

# Household Expenditure and the Income Tax Rebates of 2001

Johnson, David, S., Parker, Jonathan A, and Souleles, Nicholas S., 2006.

*American Economic Review*, 96(5): 1589-1610

# 2001 tax rebates

- Most households received tax rebates of 300 or 600 Euro in 2001
- But different households received the rebate in different weeks/months in a RANDOMIZED fashion
- Compare spending of households that received rebates in a certain period with households that did not
- Exogeneous (random) variation allows identifying *causal* effect of tax rebates on households
- What is marginal propensity to consume out of additional income?

# 2001 tax rebates

$$C_{i,t+1} - C_{i,t} = \sum_s \beta_{0s} * month_{s,i} \\ + \boldsymbol{\beta}'_1 \mathbf{X}_{i,t} + \beta_2 R_{i,t+1} + u_{i,t+1},$$

- Regress change in consumption on
  - Time dummies and other controls
  - And a measure of rebates (amount of rebates or indicator that is 1 when household had rebates)



# Contemporaneous response to tax rebate

TABLE 2—THE CONTEMPORANEOUS RESPONSE OF EXPENDITURES TO THE TAX REBATE

|                           | <i>Panel A. Dependent variable: dollar change in expenditures on:</i> |                           |                  |                  |                           |                  |
|---------------------------|---|---------------------------|------------------|------------------|---------------------------|------------------|
|                           | Food  | Strictly nondurable goods | Nondurable goods | Food             | Strictly nondurable goods | Nondurable goods |
| Estimation method         | OLS   | OLS                       | OLS              | OLS              | OLS                       | OLS              |
| <i>Rebate</i>             | 0.109<br>(0.056)  | 0.239<br>(0.115)          | 0.373<br>(0.135) |                  |                           |                  |
| <i>I(Rebate &gt; 0)</i>   |   |                           |                  | 51.5<br>(27.6)   | 96.2<br>(53.6)            | 178.8<br>(65.0)  |
| <i>Age</i>                | 0.570<br>(0.320)  | 0.449<br>(0.550)          | 1.165<br>(0.673) | 0.552<br>(0.318) | 0.391<br>(0.548)          | 1.106<br>(0.670) |
| <i>Change in adults</i>   | 130.3<br>(57.8)   | 285.8<br>(90.0)           | 415.8<br>(102.8) | 131.1<br>(57.8)  | 287.7<br>(90.2)           | 418.6<br>(102.9) |
| <i>Change in children</i> | 73.7<br>(45.3)  | 98.3<br>(82.4)            | 178.4<br>(98.3)  | 74.0<br>(45.3)   | 98.7<br>(82.5)            | 179.2<br>(98.3)  |
| RMSE                      | 934   | 1680                      | 2047             | 934              | 1680                      | 2047             |
| $R^2$ (percent)           | 0.6   | 0.6                       | 0.6              | 0.6              | 0.6                       | 0.6              |

# Longer-run response to tax rebate

TABLE 4—THE DYNAMIC RESPONSE OF EXPENDITURES TO THE TAX REBATE

|  | <i>Dollar change in:</i>  |                   | <i>Percent change in:</i> |                  | <i>Dollar change in:</i>  |                   |
|--|---------------------------|-------------------|---------------------------|------------------|---------------------------|-------------------|
|  | Strictly nondurable goods | Nondurable goods  | Strictly nondurable goods | Nondurable goods | Strictly nondurable goods | Nondurable goods  |
| <i>Panel A. Lagged rebate and baseline sample (N = 12,730)</i>                       |                           |                   |                           |                  |                           |                   |
| Estimation method  | OLS                       | OLS               | OLS                       | OLS              | 2SLS                      | 2SLS              |
| <i>Rebate</i> <sub><i>t</i>+1</sub> or<br><i>I(Rebate</i> <sub><i>t</i>+1</sub> > 0) | 0.248<br>(0.114)          | 0.386<br>(0.135)  | 1.86<br>(1.05)            | 3.29<br>(1.01)   | 0.208<br>(0.111)          | 0.386<br>(0.135)  |
| <i>Rebate</i> <sub><i>t</i></sub> or<br><i>I(Rebate</i> <sub><i>t</i></sub> > 0)     | -0.156<br>(0.099)         | -0.082<br>(0.115) | -1.89<br>(1.06)           | -1.44<br>(1.02)  | -0.190<br>(0.101)         | -0.113<br>(0.118) |
| <i>Implied cumulative fraction of rebate spent over both three-month periods</i>     |                           |                   |                           |                  |                           |                   |
|  | 0.340<br>(0.218)          | 0.691<br>(0.260)  | NA                        | NA               | 0.227<br>(0.212)          | 0.659<br>(0.262)  |

# Even-longer-run response to tax rebate

*Panel B. Two lags of rebate and extended sample (N = 15,022)*

| Estimation method                          | OLS   | OLS               | OLS             | OLS             | 2SLS              | 2SLS              |
|--|---|-------------------|-----------------|-----------------|-------------------|-------------------|
| $Rebate_{t+1}$ or<br>$I(Rebate_{t+1} > 0)$ | 0.247<br>(0.114)  | 0.386<br>(0.135)  | 1.85<br>(1.04)  | 3.29<br>(1.01)  | 0.208<br>(0.111)  | 0.386<br>(0.135)  |
| $Rebate_t$ or<br>$I(Rebate_t > 0)$         | -0.172<br>(0.097)   | -0.099<br>(0.113) | -2.17<br>(1.05) | -1.72<br>(1.01) | -0.212<br>(0.099) | -0.139<br>(0.115) |
| $Rebate_{t-1}$ or<br>$I(Rebate_{t-1} > 0)$ | -0.034<br>(0.121)   | -0.123<br>(0.141) | -0.32<br>(1.23) | -1.67<br>(1.21) | -0.055<br>(0.122) | -0.191<br>(0.142) |
|  | <i>Implied cumulative fraction of rebate spent over all three three-month periods</i> |                   |                 |                 |                   |                   |
|  | 0.362<br>(0.322)  | 0.838<br>(0.392)  | NA              | NA              | 0.145<br>(0.315)  | 0.690<br>(0.396)  |

# Liquidity constraints?

|  | <u>Dollar change in:</u>                  |                     | <u>Percent change in:</u>              |                     | <u>Dollar change in:</u>             |                     |
|--|---|---------------------|--|---------------------|--------------------------------------|---------------------|
|  | Strictly<br>nondurable<br>goods           | Nondurable<br>goods | Strictly<br>nondurable<br>goods        | Nondurable<br>goods | Strictly<br>nondurable<br>goods      | Nondurable<br>goods |
|  | <i>Interaction: Age</i>                   |                     | <i>Interaction: Income</i>             |                     | <i>Interaction: Liquid Assets</i>    |                     |
|  | Low: age $\leq$ 39<br>High: age $\geq$ 56 |                     | Low: $\leq$ 34,298<br>High: $>$ 69,000 |                     | Low: $\leq$ 1,000<br>High: $>$ 8,000 |                     |
| $Rebate_{t+1}$                             | 0.249<br>(0.177)                          | 0.363<br>(0.209)    | 0.050<br>(0.163)                       | 0.129<br>(0.184)    | -0.284<br>(0.177)                    | -0.243<br>(0.217)   |
| $Rebate_{t+1} * Low$<br>(Low group diff)   | -0.063<br>(0.210)                         | 0.033<br>(0.238)    | 0.319<br>(0.224)                       | 0.627<br>(0.266)    | 0.569<br>(0.239)                     | 0.876<br>(0.284)    |
| $Rebate_{t+1} * High$<br>(High group diff) | -0.095<br>(0.264)                         | 0.034<br>(0.304)    | 0.275<br>(0.251)                       | 0.256<br>(0.291)    | 0.312<br>(0.299)                     | 0.404<br>(0.364)    |
| $Rebate_t$                                 | -0.266<br>(0.142)                         | -0.250<br>(0.167)   | -0.080<br>(0.148)                      | -0.064<br>(0.172)   | 0.201<br>(0.226)                     | 0.283<br>(0.261)    |
| $Rebate_t * Low$<br>(Low group diff)       | 0.271<br>(0.190)                          | 0.425<br>(0.223)    | -0.053<br>(0.198)                      | -0.067<br>(0.248)   | -0.290<br>(0.253)                    | -0.292<br>(0.302)   |
| $Rebate_t * High$<br>(High group diff)     | -0.042<br>(0.228)                         | 0.010<br>(0.270)    | -0.310<br>(0.235)                      | -0.246<br>(0.275)   | -0.659<br>(0.298)                    | -0.670<br>(0.358)   |
| $N$  | 12,730                                    | 12,730              | 9,233                                  | 9,233               | 5,951                                | 5,951               |

# Liquidity constraints?

|                | <u>Dollar change in:</u>  |                     | <u>Percent change in:</u>              |                     | <u>Dollar change in:</u>             |                     |
|----------------|---|---------------------|--|---------------------|--------------------------------------|---------------------|
|                | Strictly<br>nondurable<br>goods   | Nondurable<br>goods | Strictly<br>nondurable<br>goods        | Nondurable<br>goods | Strictly<br>nondurable<br>goods      | Nondurable<br>goods |
|                | <i>Interaction: Age</i>   |                     | <i>Interaction: Income</i>             |                     | <i>Interaction: Liquid Assets</i>    |                     |
|                | Low: age $\leq$ 39<br>High: age $\geq$ 56   |                     | Low: $\leq$ 34,298<br>High: $>$ 69,000 |                     | Low: $\leq$ 1,000<br>High: $>$ 8,000 |                     |
|                | <i>Implied cumulative fraction spent over both three-month periods for each group</i> |                     |  |                     |                                      |                     |
| Baseline group | 0.232<br>(0.359)  | 0.476<br>(0.431)    | 0.020<br>(0.363)                       | 0.194<br>(0.410)    | -0.367<br>(0.405)                    | -0.203<br>(0.501)   |
| Low group      | 0.377<br>(0.323)  | 0.967<br>(0.370)    | 0.604<br>(0.347)                       | 1.380<br>(0.428)    | 0.481<br>(0.364)                     | 1.256<br>(0.425)    |
| High group     | -0.001<br>(0.395)   | 0.554<br>(0.476)    | 0.259<br>(0.421)                       | 0.461<br>(0.507)    | -0.403<br>(0.569)                    | -0.065<br>(0.704)   |