What do household estimates of MPCs tell us about national multipliers?

Motivation

- The household estimates are often considered to be on firmer ground because:

  - The experiments are often cleaner.
  - Identification is often stronger.
  - There are multiple data sets that can be used.

- Moreover, a number of TANK and HANK models are calibrated to the estimates of high MPCs out of temporary tax rebates found by Parker and others.

Questions about MPCs at the Household Level

- I will first review the leading recent studies on the MPCs out of temporary tax rebates.

- I will then argue that the aggregate implications are implausible.

- I will offer several possible resolutions.

Household-Level MPC Estimates

- MPC estimates from temporary tax rebates are based on some of the most impeccable applied-micro type empirical work.

- Johnson, Parker, Souleles (JPS) (AER 2006) studied the 2001 tax rebate and Parker, Souleles, Johnson, and McClelland (PSJM) (AER 2013), Broda-Parker (JME 2014) studied the 2008 tax rebate. **In each case:**

  - tax rebates distributed to households over several months, with timing randomized by the last two digits of Social Security numbers.

  - the authors added special questions to surveys (CE for JPS, PSJM; Nielsen Survey for Broda-Parker) that measured the time, amount, and form of the rebate for each household.

JPS & PSJM Specifications

Controls: age and family size

$$(1) \qquad C_{i,t+1} - C_{i,t} = \sum_s \beta_{0s} \times month_{s,i} + \beta_1' \mathbf{X}_{i,t} + \beta_2 ESP_{i,t+1} + u_{i,t+1},$$

The change in household *i* expenditures from *t* to *t+1* (quarterly)

Month dummy variables for every month in the sample.

The economic stimulus payment received by household in *t+1*.

What does the estimate of β_2 tell us?

It tells us how much consumption rises in *t+1* per $ ESP received in *t+1* relative to:

- Household i's consumption changes in other months.
- The average change in consumption in month t+1 for all households in the sample.

Specifications

- Extensions of the basic specification in JPS, PSJM

  - Use dummy for receipt of the ESP as an instrument for the dollar value of ESP and obtain very similar estimates.

  - Allow for lagged effects as well, adding $ESP_{i,t}$ in the regression.

- Broda-Parker specification: $$C_{i,t} = \mu_i + \beta(L)ESP_{i,t} + \tau_{m,t} + \eta_{i,t}$$

$C_{i,t}$ = $ amount of spending or ratio to earlier 2008 spending by household *i* in week *t*.
$\beta(L)$ = lead and lag polynomial
$\tau_{m,t}$ = method of disbursement interacted with week dummy.

JPS 2001 Tax Rebate Results

- Tax act was passed in May 2001. $38 billion in rebates distributed over 10 weeks, from late July to the end of September 2001.
- Most households received these one-time rebates, typically between $300 and $600.
- Table 4 estimate: Nondurable expenditure rose by 39 cents per $1 of rebate in the quarter of receipt and was still 30 cents higher in the subsequent quarter. The cumulative estimate was 0.691 with a standard error of 0.260.
- PJS “our estimates imply that the rebates directly increased aggregate nondurable consumption expenditures by an economically significant amount: about 2.9 percent in the third quarter of 2001 and 2.1 percent in the fourth quarter.” (p. 1590).

PSJM 2008 Tax Rebate Results

- Tax change enacted in Feb. 2008. $100 billion in rebates distributed from May through July 2008.

- 130 million households received these one-time rebates, $300 - $600 for singles, $600 - $1200 for married couples, plus $300 per child.

- PSJM "We find that on average households spent about 12 to 30 percent of their stimulus payments … on nondurable consumption goods and services during the three-month period in which the payments were received. This response is statistically and economically significant. We also find a significant effect on the purchase of durable goods and related services, primarily the purchase of vehicles, bringing the average response of total CE consumption expenditures to about 50 to 90 percent of the payments during the three-month period of receipt." (p. 2531)

Sahm, Shapiro, Slemrod, "Household Response to the 2008 Tax Rebate…"

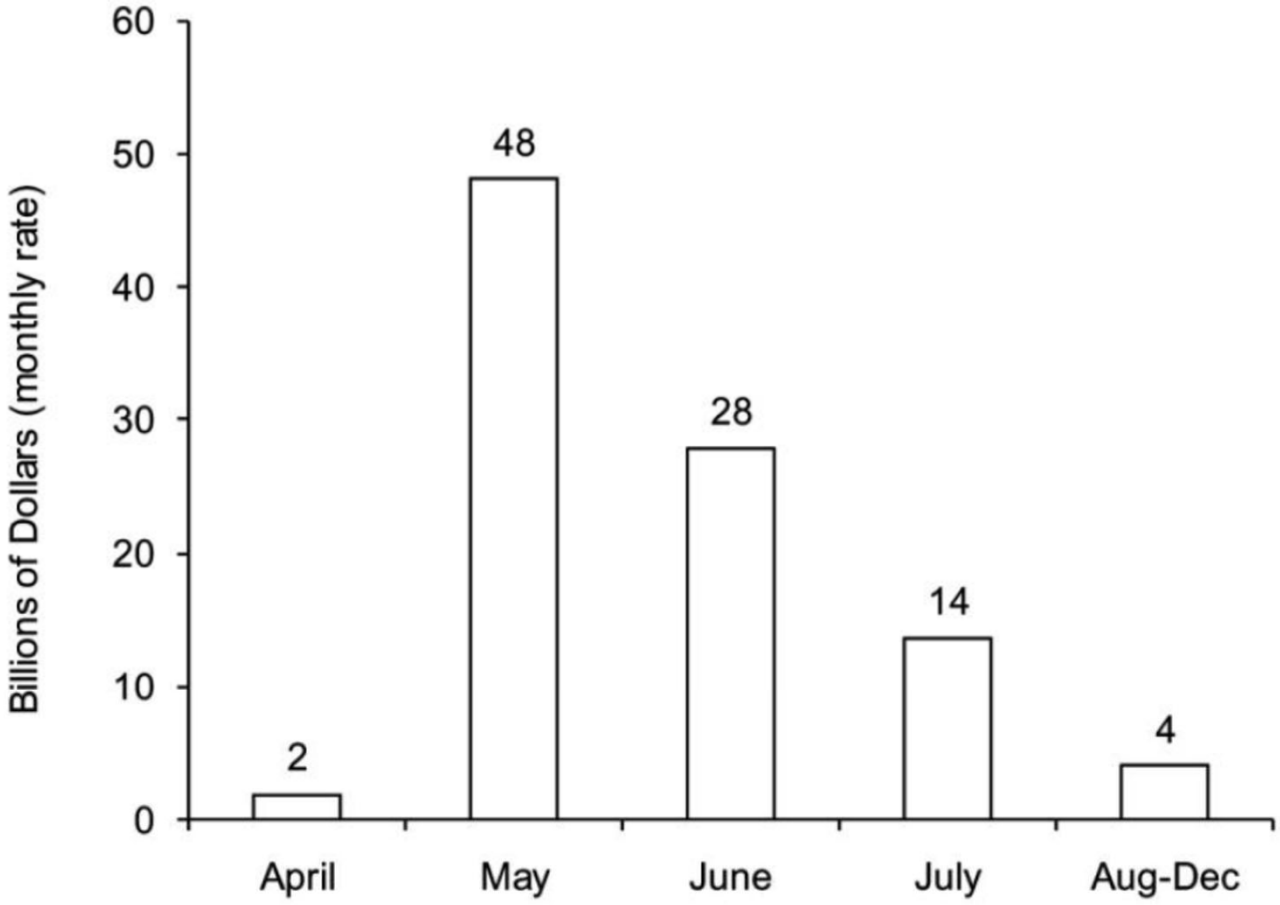


Fig. 1. Distribution of the 2008 tax rebates. Note: Data are from the Department of the Treasury. Levels are at a monthly rate in current dollars and are not seasonally adjusted.

Broda-Parker 2008 Tax Rebate Results

Table 3
The average household spending response by week.

	Using all variation in time of receipt	
Regression Specification: (Interpretation)	Dollars spent on indicator of ESP ($ spent)	Spending as pct of 2008Q1 spending on indicator of ESP (percent chg in spending)
Week before	−0.2	−1.4
	(1.8)	(1.5)
Contemporaneous week	13.8	9.8
	(2.1)	(1.8)
First week after	12.6	8.7
	(2.1)	(1.8)
Second week after	4.8	1.8
	(2.1)	(1.9)
Third week after	3.8	1.9
	(2.1)	(2.0)
Four week cumulative dollar increase or cumulative MPC	35.0	
	(5.7)	

- "… average household's spending rose by 10 percent the week it received a Payment and remained high cumulating to 1.5-3.8 percent of spending over three months. These estimates imply partial-equilibrium increases in aggregate demand of 1.3 percent of consumption in the second quarter of 2008 and 0.6 percent in the third."

Are the Aggregate Implications Plausible?

- In 2008 and 2009, Feldstein (2008) and Taylor (2009) wrote commentary based on aggregate data, arguing that most of the 2008 tax rebate was saved.

- Shapiro and Slemrod (2009) and Sahm, Shapiro, and Slemrod (2012) found smaller MPCs (0.13 to 0.25) using the Michigan Survey based on questions about individuals' intent. They also made the point that the aggregate data did not seem to be consistent with the high MPCs estimated by Parker and co-authors.

Let's consider some counterfactuals:

What would have happened to aggregate consumption and saving had there been no 2008 tax rebate?

1. Broda-Parker 2008 Tax Rebate Counterfactual

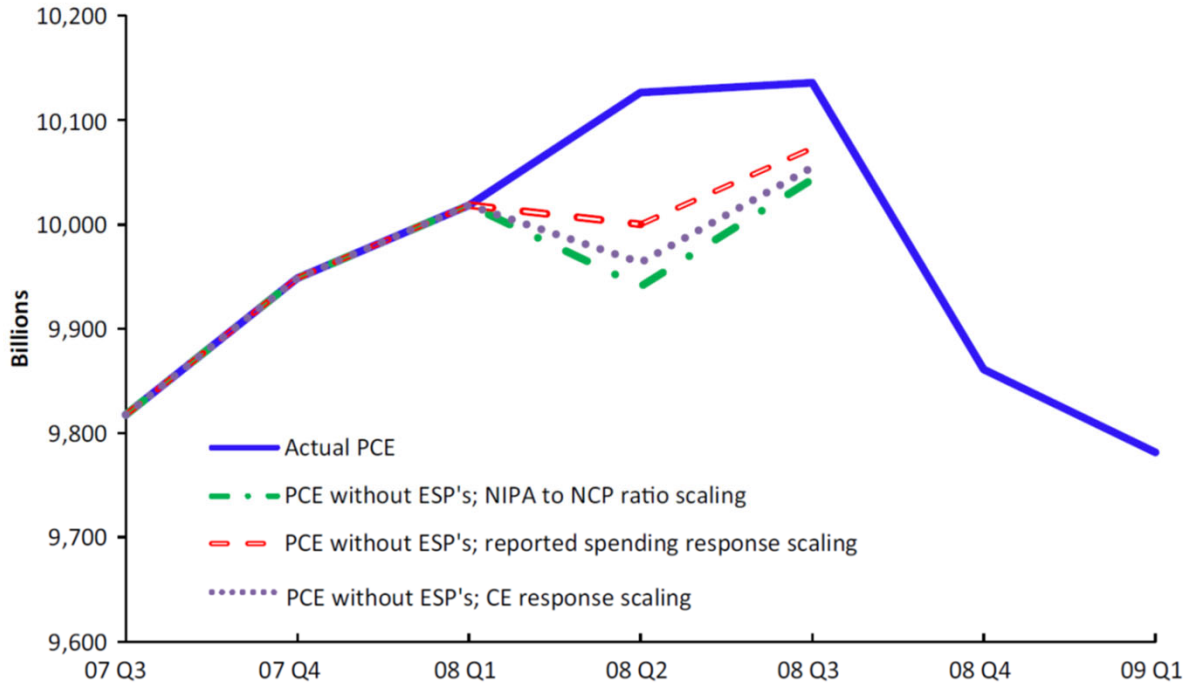


Fig. 1. Actual NIPA personal consumption expenditures and accounting alternatives. *Notes*: Estimates based on Table 4; Panel A last column. Alternative scenarios subtract the sum of the ESPs distributed in each month times the MPC's reported in Table 5 from the actual NIPA PCE series. Calculated based on data from The Nielsen Company (US) LLC and provided by the Marketing Data Center at the University of Chicago Booth School of Business.

Note that Broda-Parker's own counterfactual suggests that consumption in 2008Q2 would have been lower than in 2008Q3 even though Lehman Brothers went bankrupt in early September 2008.

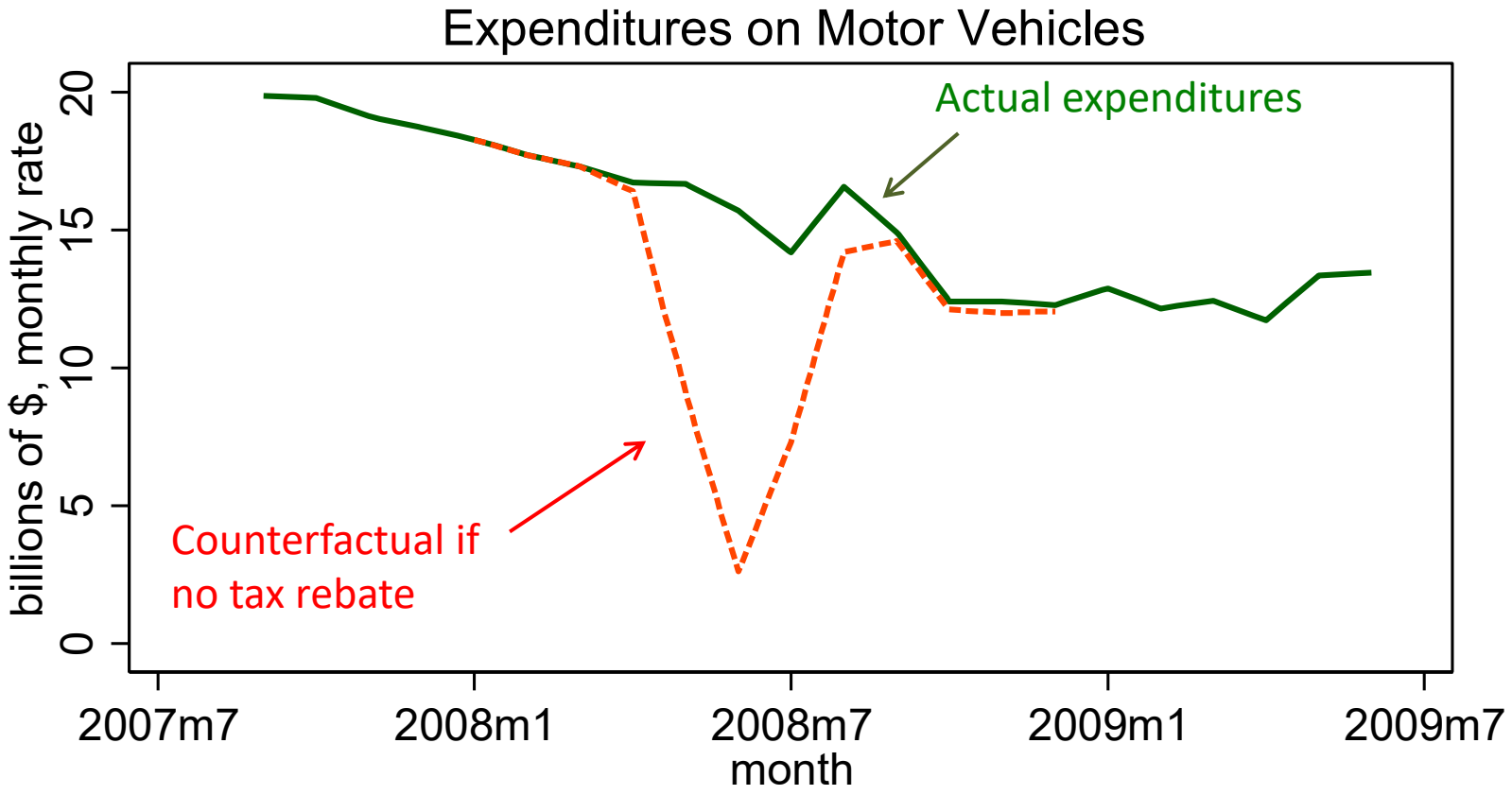
2. Sahm-Shapiro-Slemrod (2012) Counterfactual

- When comparing their smaller estimated MPCs to PSJM's estimates, they conduct a counterfactual based on PSJM's motor vehicle estimates.

- Recall that purchases of motor vehicles was the prime reason PSJM found such a high MPC.

- At the back of the Sahm-Shapiro-Slemrod paper, Table 14 uses PSJM's estimated MPC on new motor vehicles to calculate the partial equilibrium counterfactual for aggregate expenditures on motor vehicles if there had been no tax rebate.

2. Sahm-Shapiro-Slemrod (2012) Counterfactual



Sahm-Shapiro-Slemrod (2012) Table 14, converted to monthly rates, updated with revised actual expenditures. Based on PSJM headline estimates.

3. Saving Rate Counterfactual

- Based on an argument made by Feldstein (2008), Taylor (2009), and Slemrod-Shapiro (2009).

- I will show using aggregate data:

(1) how big the rebate was relative to disposable income

(2) what happened to the saving rate

(3) a back-of-the-envelope calculation for the implied MPC

3. Saving Rate Counterfactual

Definition of Variables

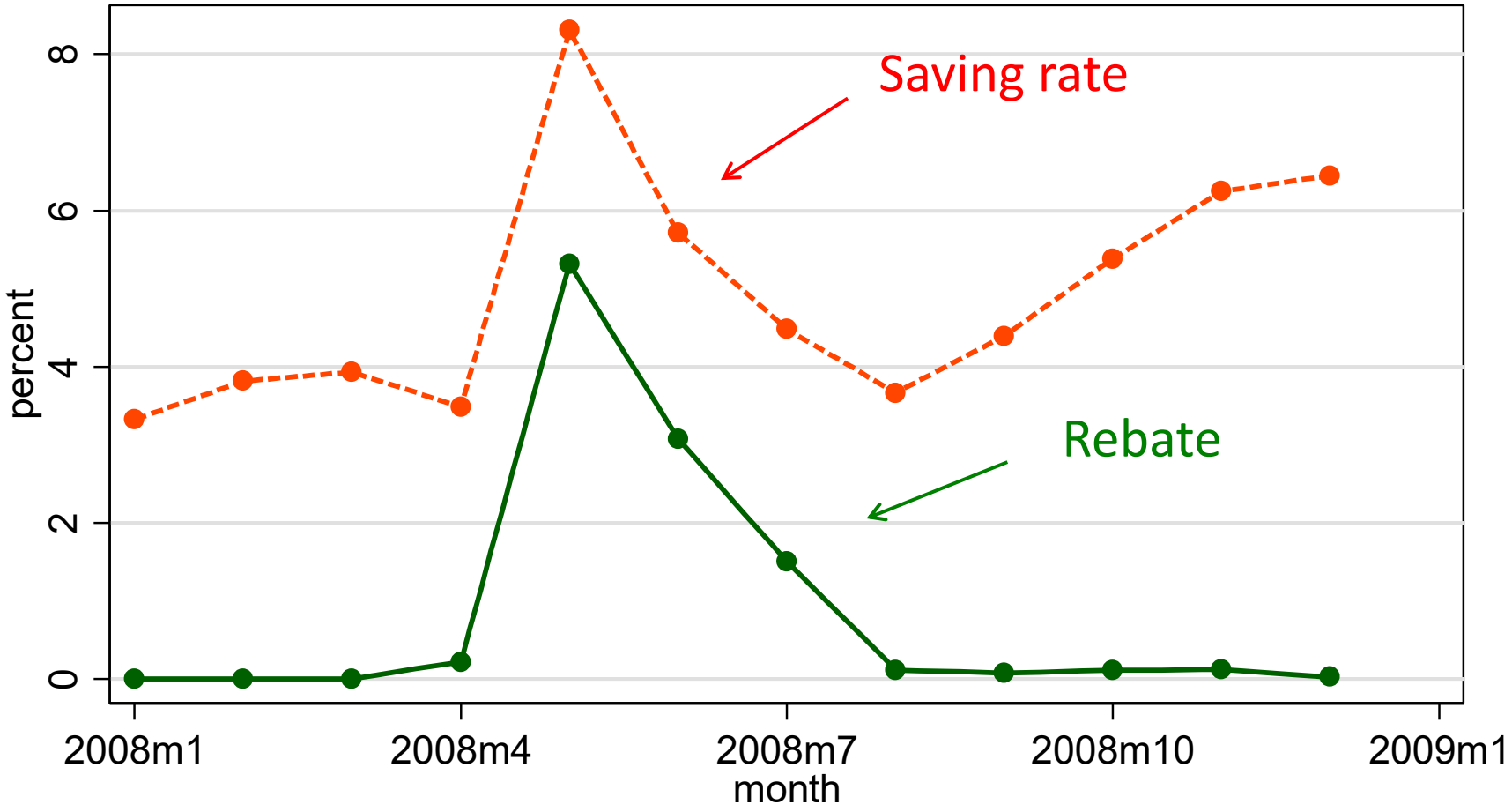
DPI = Disposable Personal Income

DPIx = DPI - Rebate

Rebate % of Non-Rebate DPI = 100* Rebate/DPIx

Saving % of Non-Rebate DPI = 100* Saving/DPIx

2008 Rebate and Saving Rate
as a % of Disposable Income (excluding rebate)



Back of the Envelope Calculation

DPI = Disposable Personal Income

DPIx = DPI - Rebate

Rebate % of Non-Rebate DPI = 100* Rebate/DPIx

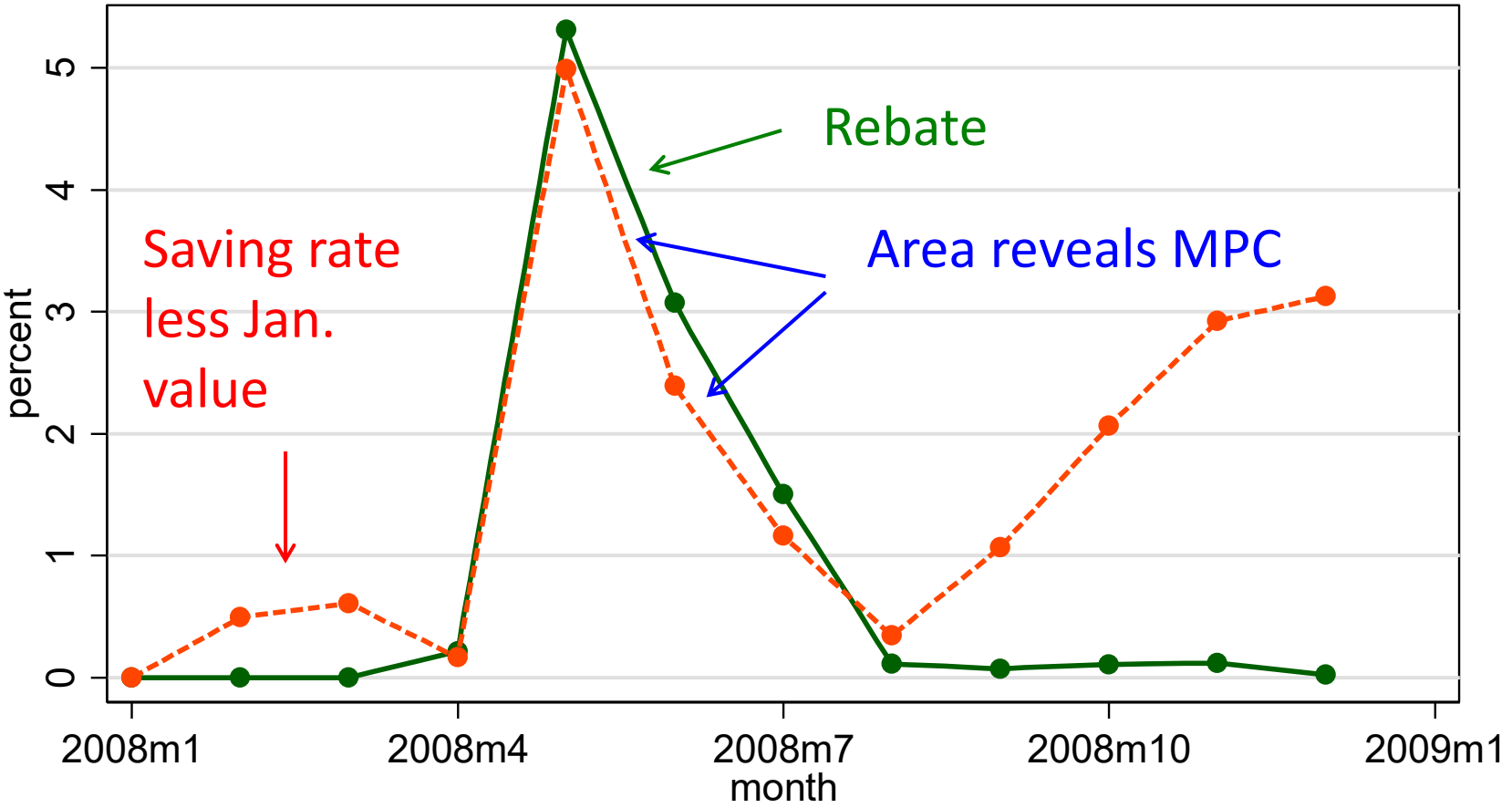
Saving % of Non-Rebate DPI = 100* Saving/DPIx

Considering only the partial equilibrium, rewrite saving:

Saving % of Non-Rebate DPI

= 100*(Saving from DPIx + (1-mpc)*rebate)/DPIx

2008 Rebate and Saving Rate
as a % of Disposable Income (excluding rebate)



The area between the rebate percent and the saving rate percent from 2008m4 should be approximately equal to cumulative MPC. I calculate 0.13.

Implications of the Counterfactuals

Applying the micro estimates to aggregate data leads to implausible counterfactuals:

- Broda and Parker's counterfactual suggests that consumption would have been lower in the summer of 2008 and then recovered in the fall of 2008.

- PSJM estimates imply a cumulative MPC of 50 to 90%, with much of it driven by transportation (mostly motor vehicles). Sahm-Shapiro-Slemrod's counterfactual for new purchases of motor vehicles shows an implausible counterfactual.

- My back-of-the-envelope calculation based on aggregate saving rates suggests an MPC of about 13%

Possible Explanations

1. Precision. Some of the micro estimates are not very precise. In PSJM's contemporaneous model, the estimated MPC for total consumption is 0.507 with a standard error of 0.196. In the cumulative model, the estimate is 0.747 with a standard error 0.477.

2. Micro MPCs ≠ Macro MPCs. Recall that the household level estimates give only *relative* MPCs, relative to the household's MPC in other months and relative to the aggregate during the month. If households are waiting until the rebate arrives to put a down payment on a car, their spending may fall in the non-rebate months.

3. Heterogeneous responses. Misra-Surico (2014)

2. Micro MPCs ≠ Macro MPCs

$$(1) \qquad C_{i,t+1} - C_{i,t} = \sum_s \beta_{0s} \times month_{s,i} + \beta_1' \mathbf{X}_{i,t} + \beta_2 ESP_{i,t+1} + u_{i,t+1},$$

- PSJM's estimates of β_2 are significantly different from 0, so they can reject the pure LCPIH with rational expectations at standard significance levels.
- However, I will argue that they cannot interpret their estimate of β_2 as an MPC that is relevant for the aggregate.
- I will simulate two simple models of consumer behavior that yield their β_2 but that do not apply to aggregate consumption expenditures.

Simple Simulations

- Balanced panel of 4,000 households over 12 months.
- All households have mean monthly disposable income of 100 (without rebate) and they save 4% on average (which matches pre-rebate saving rate).
- Both income and consumption are hit by *iid* normal shocks, with variance 1 and 0.5 respectively.
- A one-time tax rebate, equal to 10% of one month's income, announced in month 1 is distributed randomly, calibrated to the monthly arrival rate in the actual data.

A. Hand-to-Mouth Consumers Experiment

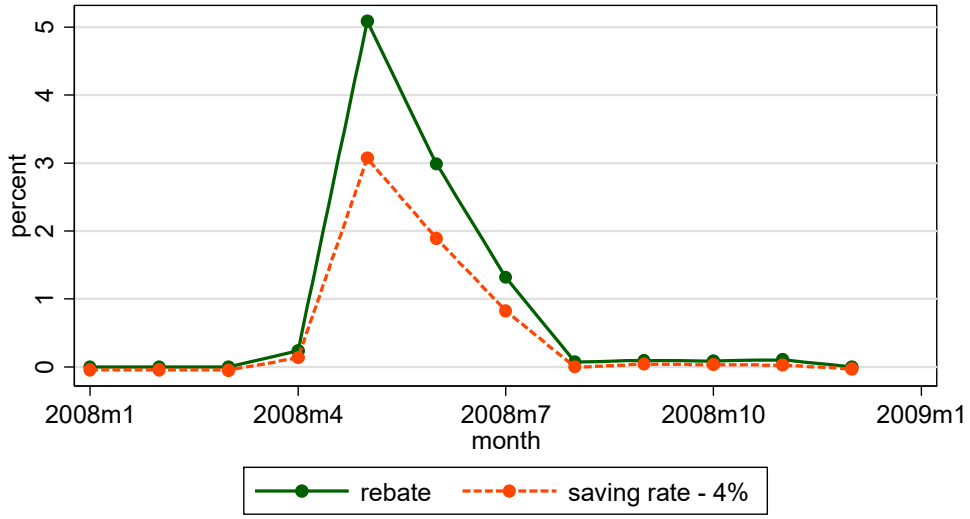
- λ of the households are hand-to-mouth consumers, with MPC = 1, (1- λ) are LCPIH consumers who spend 5% of the rebate each year.

- Interestingly, there is not a one-to-one mapping of λ to the estimated . In order to estimate a $\beta_2 = 0.5$ on the household data, I needed to calibrate $\lambda = 0.38$.

- When I aggregate the data (not allowing for any general equilibrium effects) and plot the same rebate percent of disposable income and saving rate as a percent of disposable income (both excluding rebate in the denominator), I obtain the following graph:

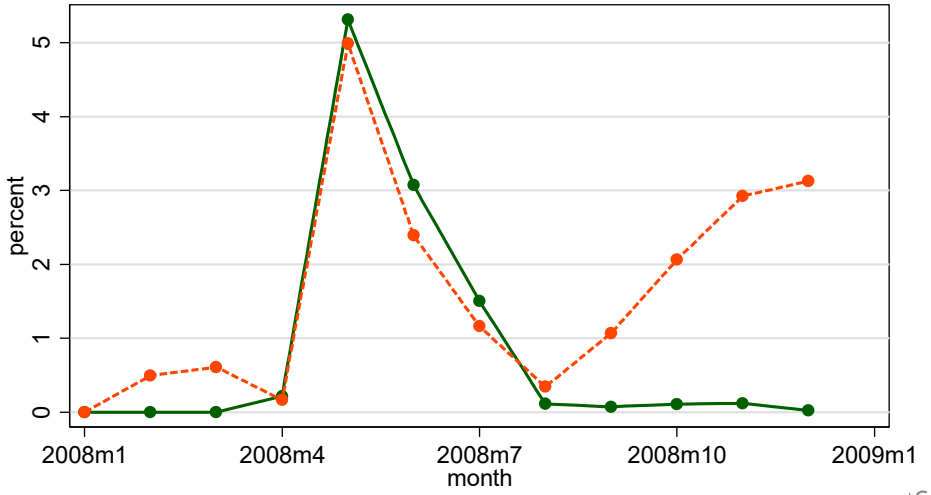
A. Hand-to-Mouth Consumers Experiment

Simulated Data



Estimated β = 0.5 in the household data.

Actual Data



Thus, the fraction hand-to-mouth consumers that produces the PSJM estimated β in the micro data cannot produce the aggregate data.

B. Long-run LCPIH with Short-run Bunching Experiment

- All households are assumed to be permanent income consumers on an annual basis, spending a cumulative annuity rate of 5% of the rebate spread over the 12 months.

- However, because of short-term liquidity constraints, discrete purchases, down payments on cars, etc. they intertemporally substitute their spending to the month in which the rebate check arrives.

- Timing:

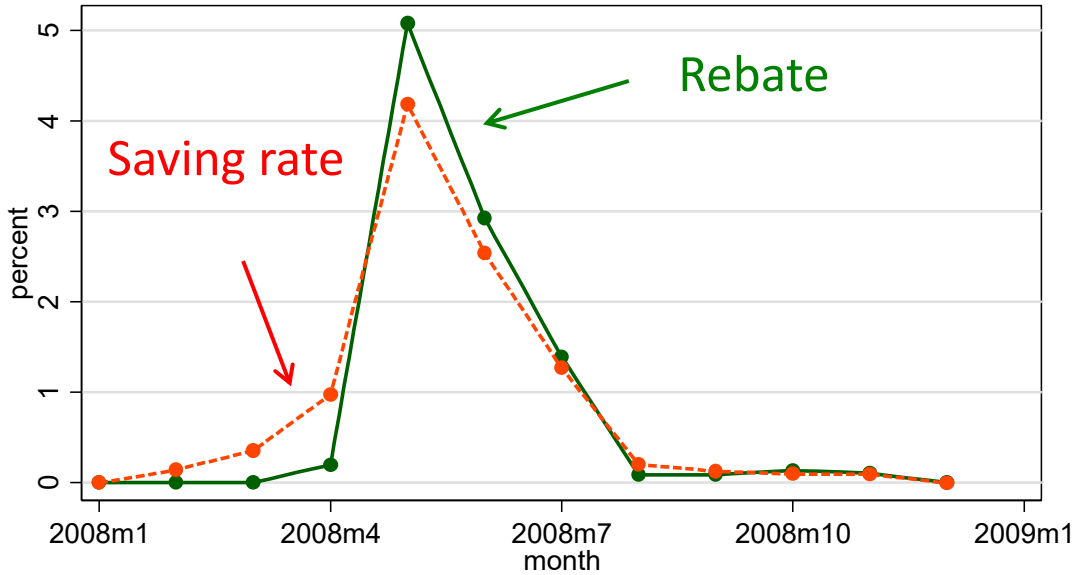
Note that the concurrent MPC = 0.265.

Month relative to rebate check arrival	**% spent of rebate**
-3	- 3
-2	- 5
-1	-12
0	26.5
1	- 4
2	- 2

B. Long-run LCPIH with Short-run Bunching Experiment

- When I estimate the PSJM equation on my household panel data, I estimate $\beta_2 = 0.503$ (with a standard error of 0.002).

- When I aggregate the data (not allowing for any general equilibrium effects) and plot the same rebate percent of disposable income and saving rate as a percent of disposable income (both excluding rebate in the denominator), I obtain the following graph:



This looks much closer to the actual aggregate data.

Bottom Line:

Most micro studies are estimating *relative*

***MPCs*, which are not suitable for macro uses.**

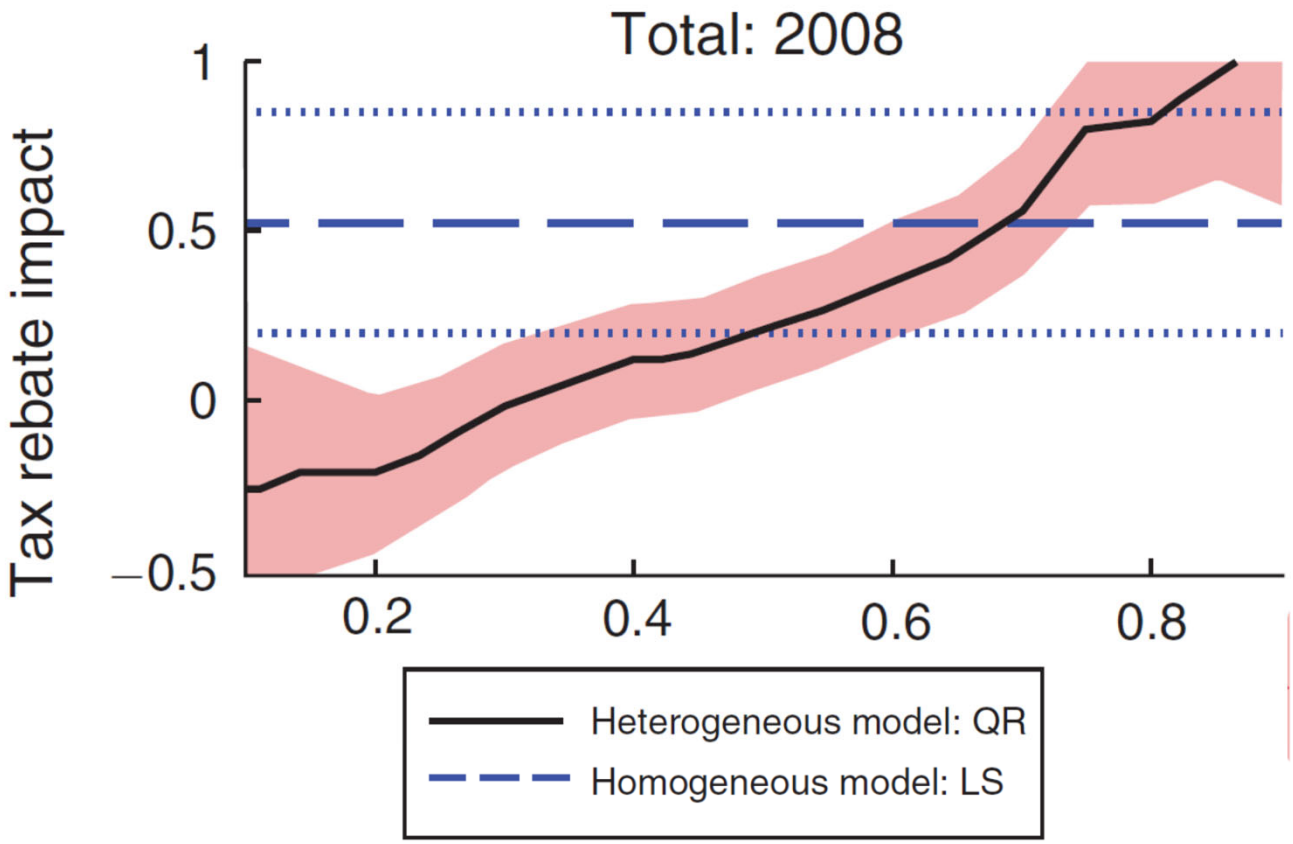
3. Heterogeneous Responses

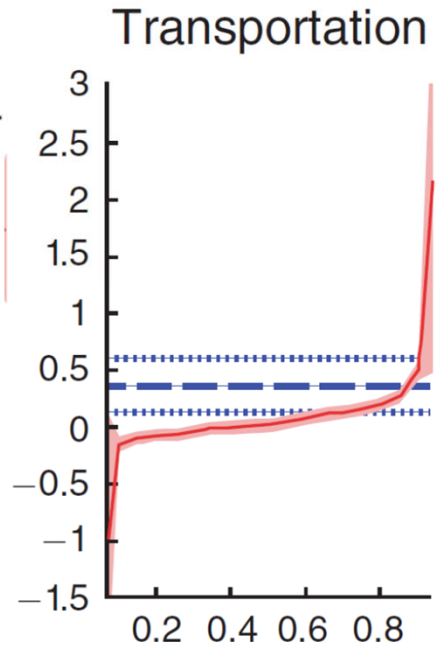
- Misra-Surico (2014 AEJ: Macro) revisit the JPS and PSJM studies of the 2001 and 2008 tax rebates.

- Based on the new insights from heterogenous agent models, they argue that it is important to allow for heterogeneity of responses across households in the estimation.

- To do this empirically, they use a Quantile Regression model that estimates unobserved heterogeneity.

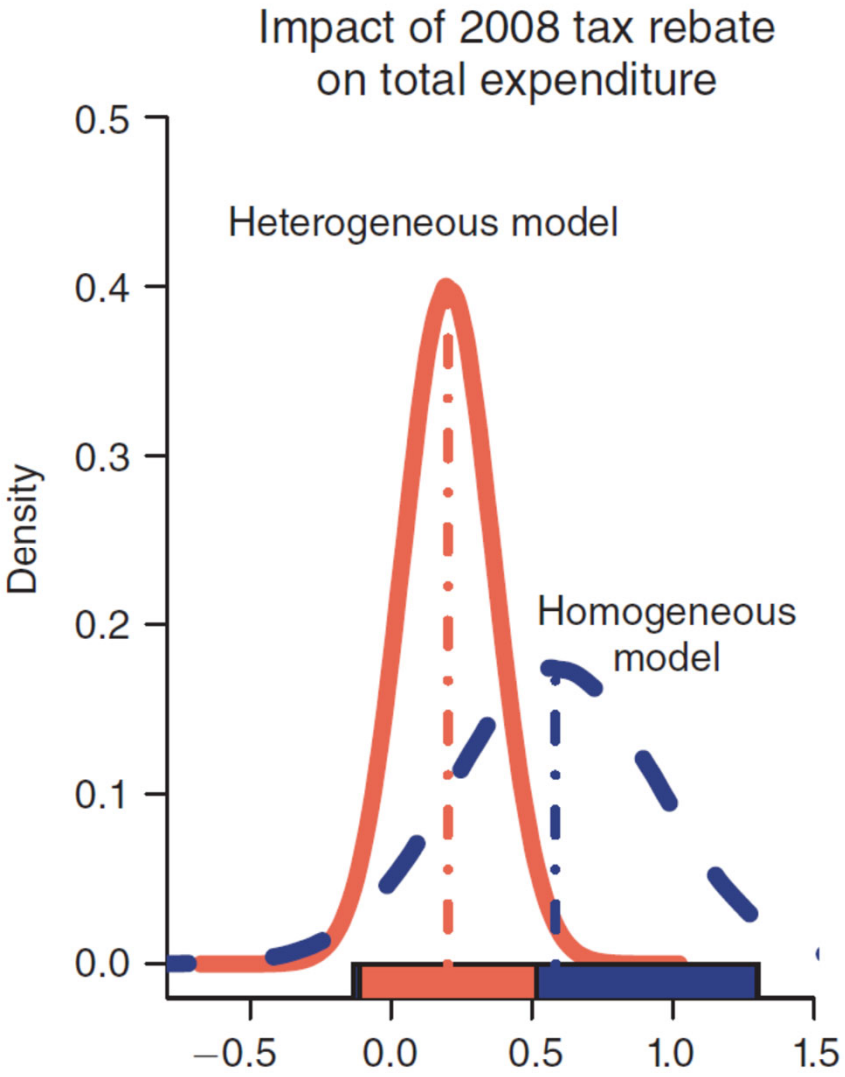
Misra-Surico (2014 AEJ: Macro)





It turns out that the most heterogeneous responses are the ones for transportation (e.g. new cars). Recall that this response was important for the overall effect.

Misra-Surico (2014 AEJ: Macro)



The homogenous model estimates are centered on 0.58, which is PSJM's headline estimate.

The heterogenous model estimates are centered on 0.16.

Lessons Learned about Micro Estimates of MPCs

- Heterogeneity of responses can affect estimates even in micro data.

- MPCs estimated at the household level usually reveal only relative effects and cannot be used to draw aggregate conclusions. For example, a high contemporaneous effect of a temporary rebate on consumption growth is consistent both with hand-to-mouth consumers and households intertemporally substituting expenditures because of short-term liquidity constraints.

- Counter-factual aggregate calculations are a helpful adjunct to judge the plausibility of household estimates for macro.