Consumption Heterogeneity: Micro Drivers and Macro Implications

Edmund Crawley — Federal Reserve Board

Andreas Kuchler — Danmarks Nationalbank

CFPB Research Conference
December 12, 2019

What Do We Do?

We estimate the **consumption response**

to permanent and transitory **shocks to income**

for **different groups** of households

Hasn't This Been Done Before?

Yes, but...

Our **method** addresses bias in previous results

Our **data** allows sharp focus on household heterogeneity

Hasn't This Been Done Before?

Time Aggregation Problem

Yes, but... ↑

Our **method** addresses bias in previous results

Our **data** allows sharp focus on household heterogeneity

Hasn't This Been Done Before?

Yes, but...

Time Aggregation Problem

Our **method** addresses bias in previous results

Our **data** allows sharp focus on household heterogeneity

Sample size in millions

Detailed balance sheet

What do we find? (Liquid Wealth)

Low Liquid Wealth Households:

- Hand-to-Mouth
- Spend 85 cents out of every marginal dollar, both transitory and permanent

What do we find? (Liquid Wealth)

Low Liquid Wealth Households:

- Hand-to-Mouth
- Spend 85 cents out of every marginal dollar, both transitory and permanent

High Liquid Wealth Households:

- Large Response to Transitory Shocks (25 cents per dollar)
- Small Response to Permanent Shocks (60 cents per dollar)

relative to Permanent Income Hypothesis or Buffer-Stock models

What do we find? (Redistribution in Monetary Policy)

What do we find? (Redistribution in Monetary Policy)

Medium MPX
≈ 0.5

High MPX
≈ 0.8

Low MPX
≈ 0.25

MPX: Marginal Propensity to eXpend (includes durables)

What do we find? (Redistribution in Monetary Policy)

Medium MPX
≈ 0.5

High MPX
≈ 0.8

Low MPX
≈ 0.25

↙

Decrease spending
a *lot*

↘

Increase spending
a *little*

What do we find? (Redistribution in Monetary Policy)

1yr rate $\uparrow$ 1%

Aggregate Spending $\downarrow$ 26 basis points

Through this redistribution channel *alone*

How Do We Do This? Reduced Form Approach

Identifying Restrictions on

Income

and

Consumption

In **Continuous** Time

How Do We Do This? Reduced Form Approach

Identifying Restrictions on

Income → Permanent (random walk) shocks
Income → Transitory (<2 years) shocks

and

Consumption

In **Continuous** Time

How Do We Do This? Reduced Form Approach

Identifying Restrictions on

Income → Permanent (random walk) shocks
Income → Transitory (<2 years) shocks

and

Consumption → Permanent (random walk) response
Consumption → Transitory (<2 years) response

In **Continuous** Time

How Do We Do This? Reduced Form Approach

Identifying Restrictions on

Income → Permanent (random walk) shocks
Income → Transitory (<2 years) shocks

and

Consumption → Permanent (random walk) response
Consumption → Transitory (<2 years) response

In **Continuous** Time ⟶ Time Aggregation Bias

How Do We Do This? Reduced Form Approach

Identifying Restrictions on

Income → Permanent (random walk) shocks
Income → Transitory (<2 years) shocks

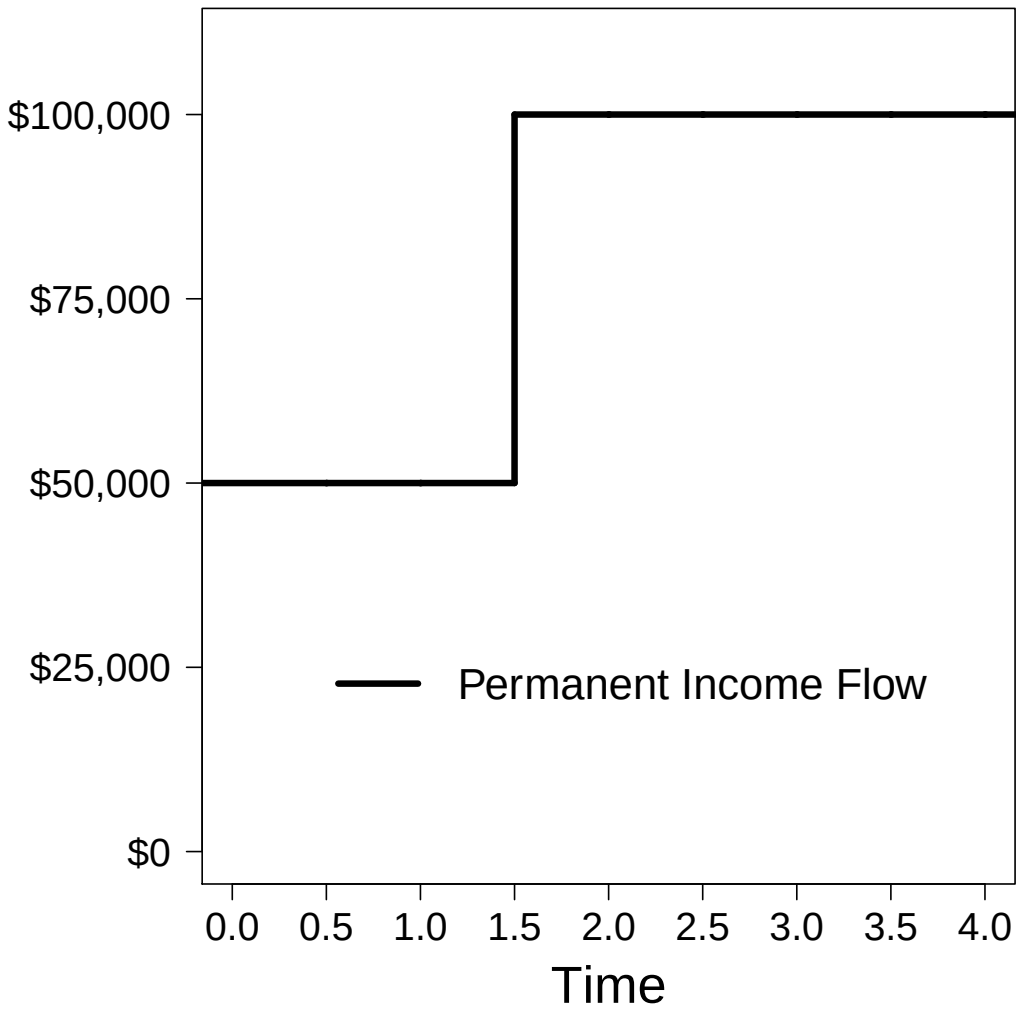
and

Consumption → Permanent (random walk) response
Consumption → Transitory (<2 years) response

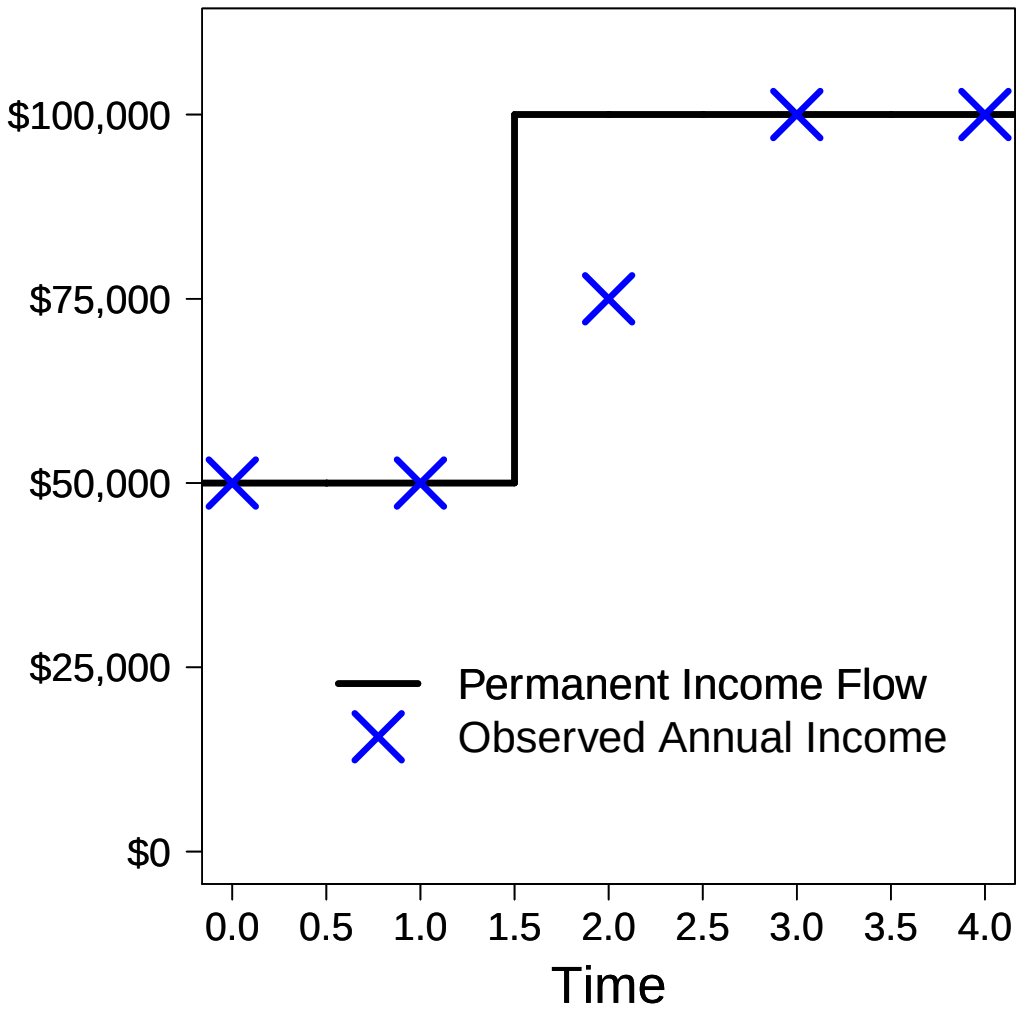
In **Continuous** Time ⟶ Time Aggregation Bias

Time Aggregation Bias is large:
Our average MPX ≈ 0.5
Blundell, Pistaferri and Preston (2008) MPX ≈ 0.13

Time Aggregation Problem



Time Aggregation Problem



Data

What we need:

- Panel Data on **Income** and **Expenditure**
- Household **Balance Sheets**

Data

What we need:

- Panel Data on **Income** and **Expenditure**
- Household **Balance Sheets**

What we have: Registry data for all Danish households

- **Income**

  Third party reported
- **Balance Sheet**

  Wealth on 31 Dec

  Asset category, mortgage tenure
- **Expenditure**

  No *direct* measure of spending

Data: Expenditure

Household budget constraint

$$\text{Expenditure} = \text{Income} - \text{Saving}$$

Data: Expenditure

Household budget constraint

$$\text{Expenditure} = \text{Income} - \text{Saving}$$

$$\downarrow$$

$$= \text{Change in Net Worth (adj. for capital gains)}$$

Data: Expenditure

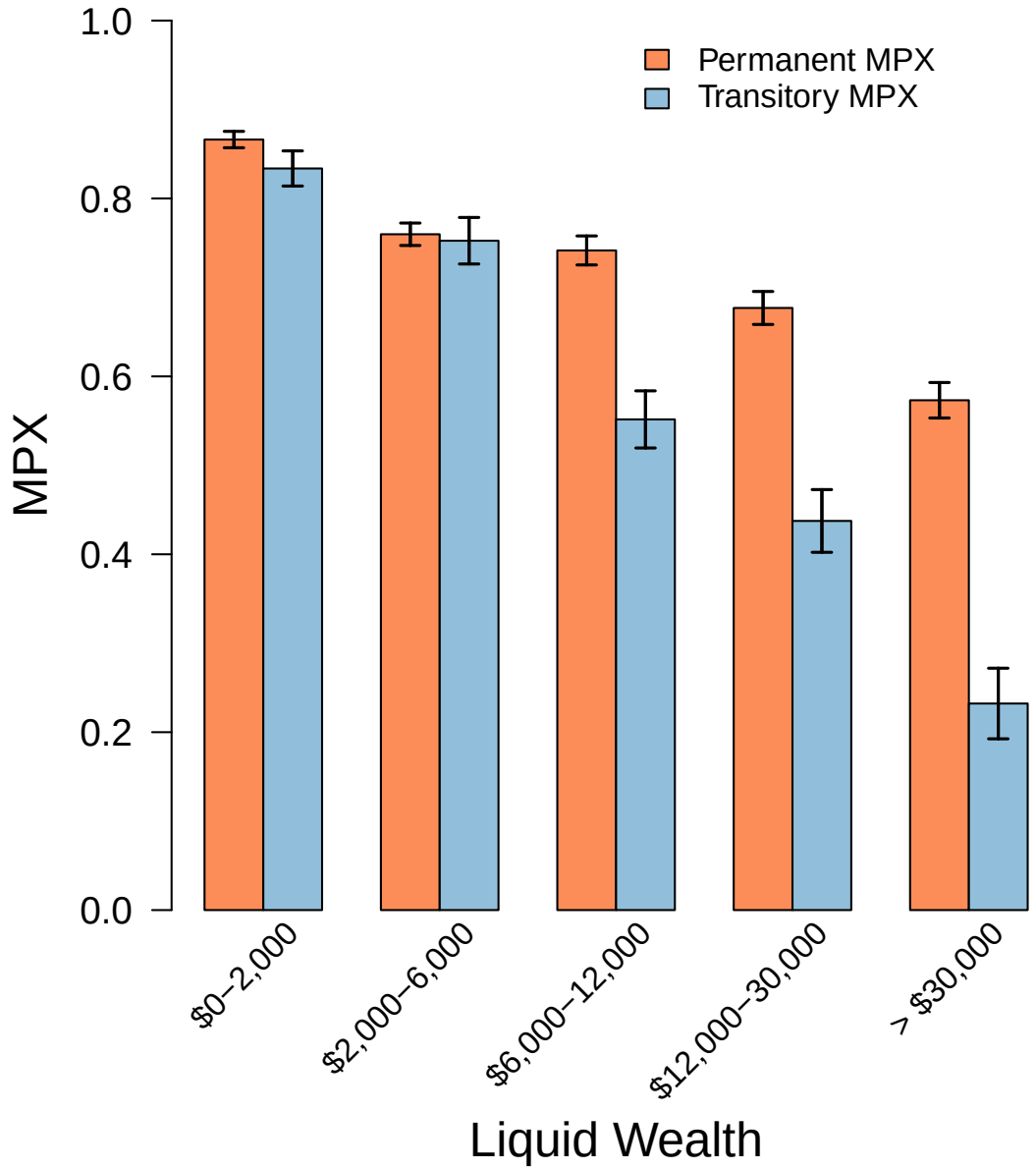
Household budget constraint

$$\text{Expenditure} = \text{Income} - \text{Saving}$$

$$\text{Saving} = \text{Change in Net Worth (adj. for capital gains)}$$

- Works well for households with simple financial lives
- Problem: Capital gains
  - Houses off balance sheet (exclude transaction years)
  - Exclude business owners
  - Capital gains based on a diversified index
- Noisy, but perhaps better than surveys (Kuchler et al. 2018)
- Huge sample size advantage: sample covers 7.6 million observations over 2004-2015

MPX by Liquid Wealth Quintile



Monetary Policy: Interest Rate Exposure Channel

Some households pay interest

Some households receive interest

Monetary Policy: Interest Rate Exposure Channel

Some households pay interest
Some households receive interest

Monetary policy redistributes between these groups
The aggregate effect depends on differences in spending response

Monetary Policy: Interest Rate Exposure Channel

Some households pay interest
Some households receive interest

Monetary policy redistributes between these groups
The aggregate effect depends on differences in spending response

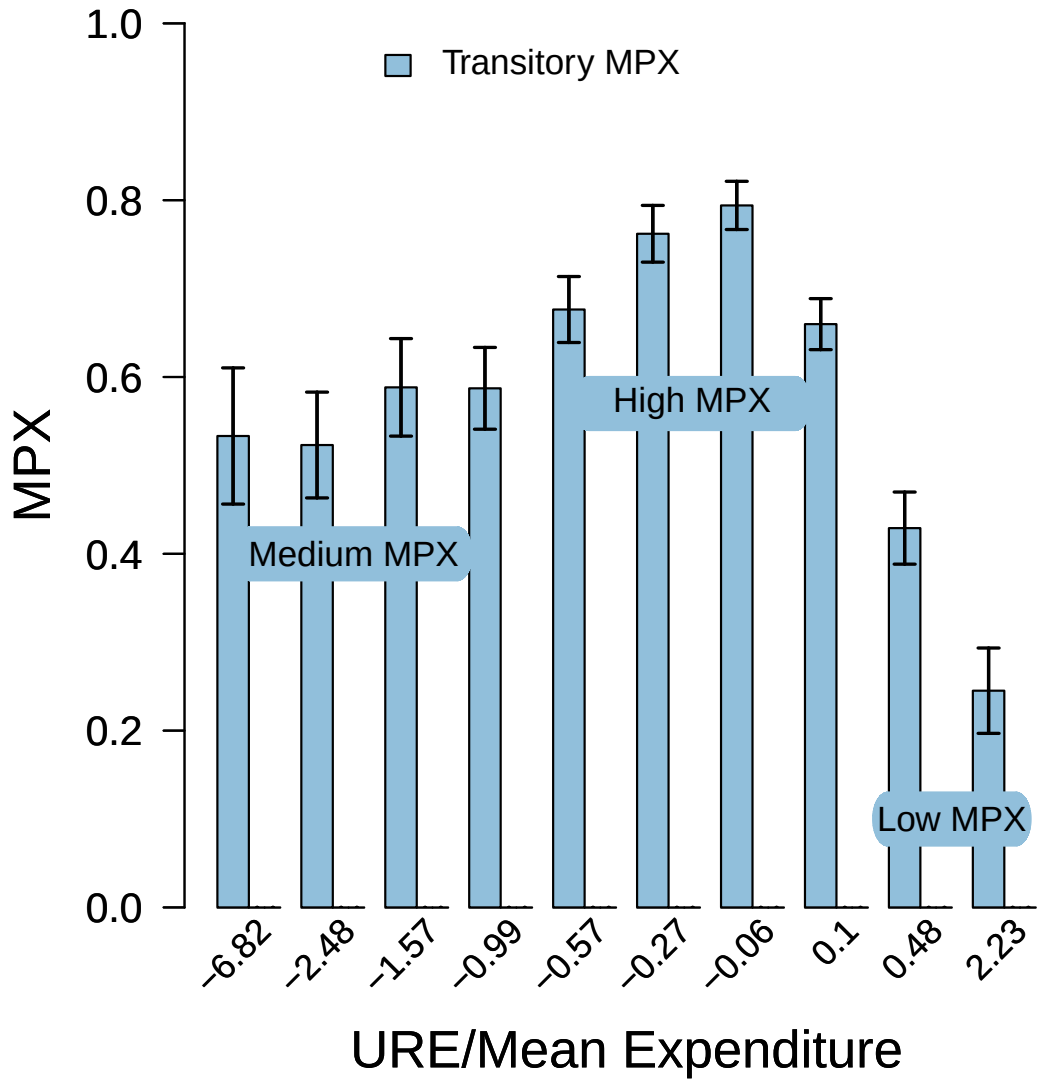
Need to know the distribution of MPX by **Unhedged Interest Rate Exposure**:

$$URE_i = Y_i - C_i + A_i - L_i$$

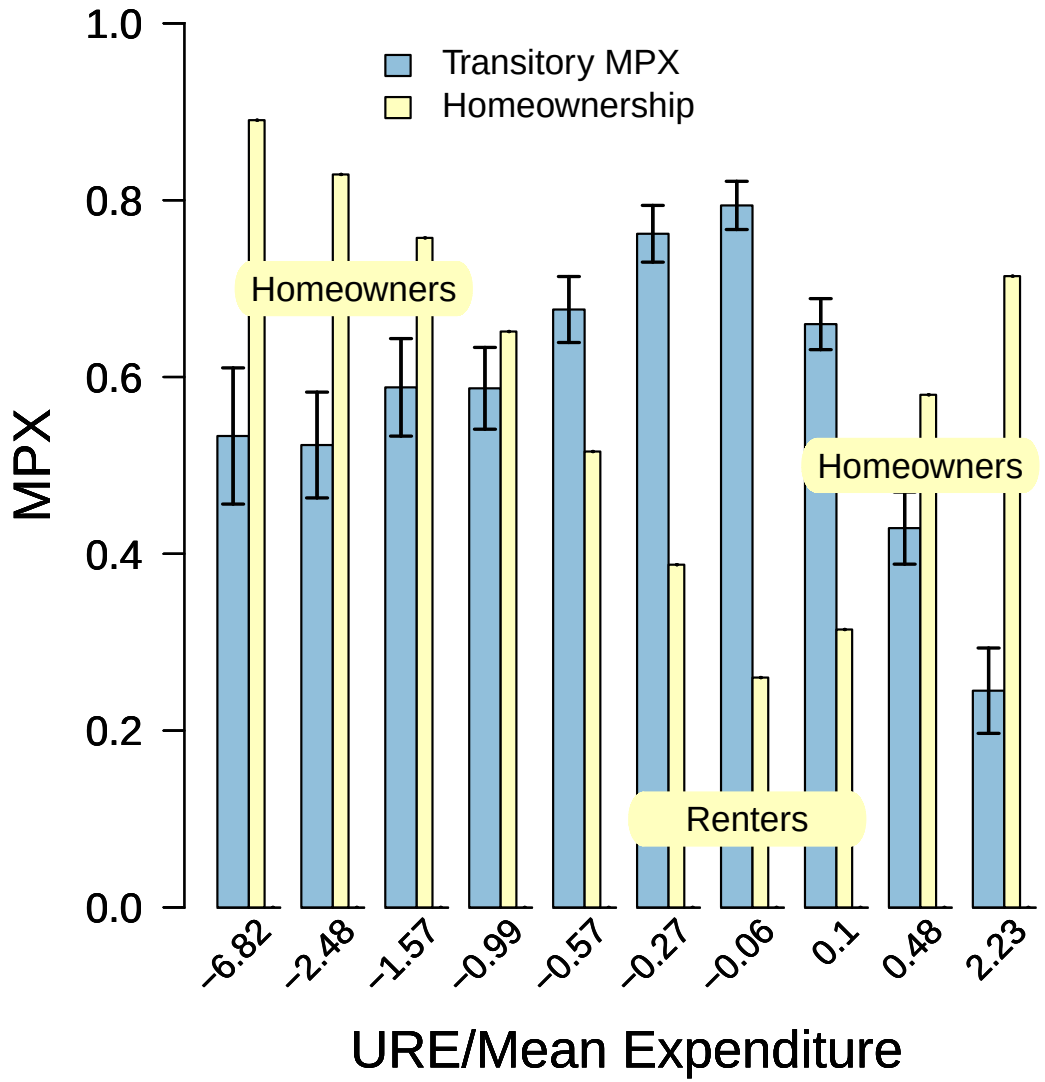
Where

- Y_i = Total after tax income
- C_i = Total Expenditure, including interest payments
- A_i = Maturing assets
- L_i = Maturing liabilities

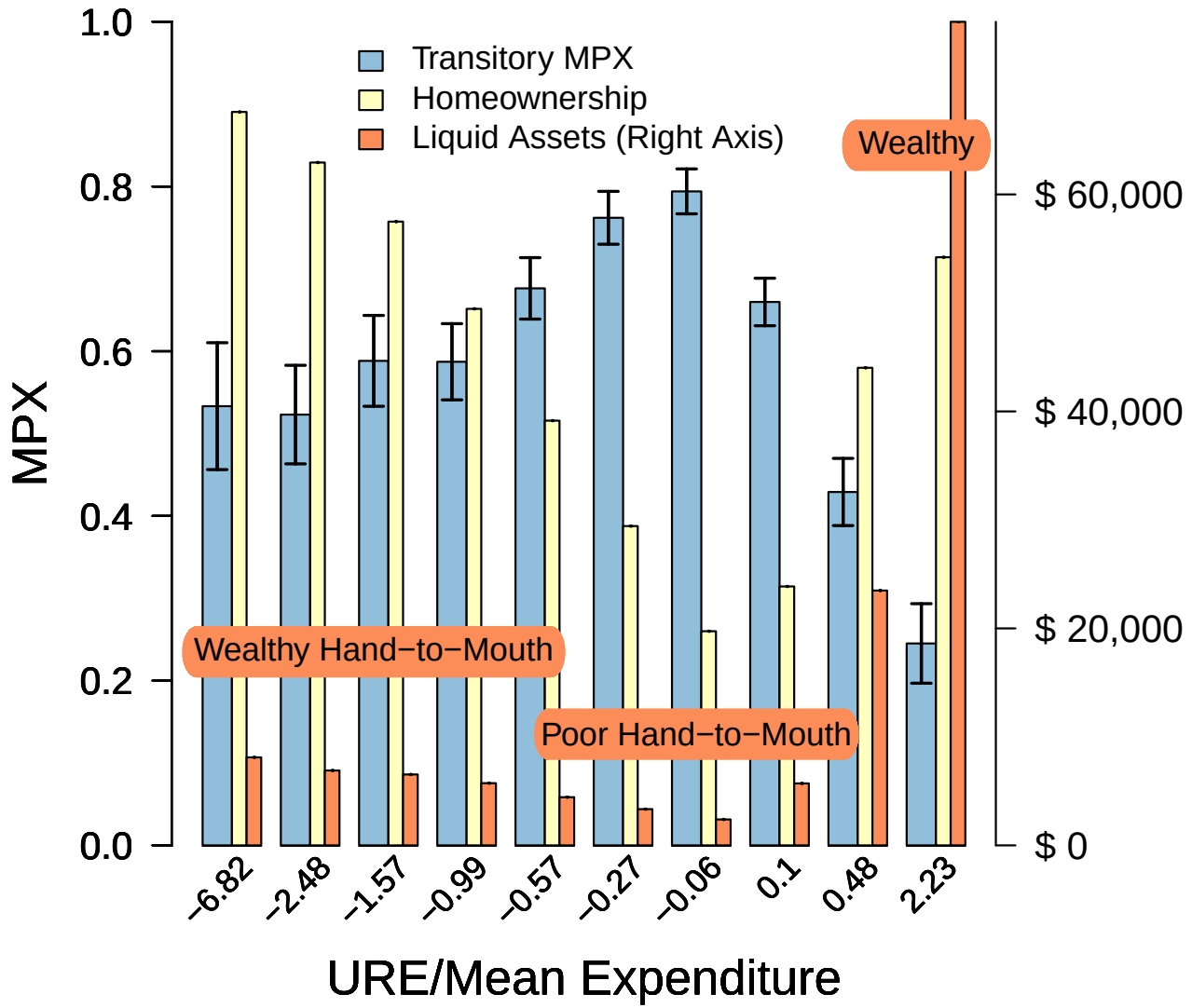
MPX by Unhedged Interest Rate Exposure



MPX by Unhedged Interest Rate Exposure



MPX by Unhedged Interest Rate Exposure



Monetary Policy: Interest Rate Exposure Channel

1yr rate ↑ 1%

Aggregate Spending ↓ 26 basis points

↙

Through this redistribution channel *alone*

Conclusion

New Method to Estimate Consumption Behavior

- Corrects for Time Aggregation Bias
- Estimates align with natural experiment literature
- Potential to use on a wide variety of datasets and applications

Applied to Danish Registry Data

- Sample Size $\Longrightarrow$ Sharp Focus on Heterogeneity
- High MPX from transitory shocks, Low MPX from Permanent shocks
- Quantify Monetary Policy Transmission Channels

Thank you!