The Cross Section of Household Preferences and the MPC: Evidence from high frequency data

Elena Andreou **Maria Demetriadou** Andreas Tryphonides

University of Cyprus

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Motivation

- Renewed attention in *ex-ante* heterogeneity in heterogeneous agent macroeconomics.
- Matters for wealth heterogeneity (Krusell and Smith (1998), Gomes and Michaelides (2008)), the marginal propensity to consume (Kaplan and Violante, 2022; Carroll, Slacalek, Tokuoka, and White, 2017).
- Recent evidence shows that observed consumption behavior is inconsistent with the benchmark incomplete markets model with homogeneous preferences (Aguiar, Bils, and Boar, 2021).

Liquidity Constraints

- A common theme of the existing studies is that they ignore the presence of liquidity constraints.
- Why liquidity constraints matter?
    - Crawley and Kuchler (2020): response of consumption to income shocks differ across households with different levels of liquid wealth.
    - Boutros (2019): households with less liquid wealth are more likely to repay debt
    - Jappelli and Pistaferri (2014) and Parker (2017): households with low liquidity have a much higher MPC
    - Kaplan, Violante and Weidner (2014): hand-to-mouth households, especially wealthy ones, exhibit the largest consumption responses to transitory income shocks.

Do liquidity constraints matter?

- Alan, Browning and Ejrnaes (2018) employed PSID data from 1968 to 2009 to estimate the distribution of discount factor and risk aversion, allowing for vast heterogeneity.
- They test their specification by examining the excess sensitivity of consumption to current income using a QLM test.
- No evidence of excess sensitivity.

Do liquidity constraints matter?

- We replicated the results of Alan, Browning and Ejrnaes (2018) for 1968-2009 (their sample) and 1968-1997 (before PSID turned biennial)$\Longrightarrow$ Indeed, no evidence of excess sensitivity.
- We repeated the estimation using the updated full sample 1968-2019 and the biennial sample 1999-2019 $\Longrightarrow$ Evidence of excess sensitivity.
- We repeated all of the above tests using the Kilts-Nielsen Consumer Panel (KNCP) dataset, which involves a more comprehensive measure of consumption to PSID, where we aggregated to yearly consumption $\Longrightarrow$ Evidence of excess sensitivity.

- The evidence on excess sensitivity of consumption on income implies that we can not ignore the inequality in the Euler equation.
- We employ recursive preferences (Epstein-Zin-Weil preferences)
- **Key idea**: Preferences are no longer point identified i.e. there is no unique value for $(\beta_i, \gamma_i, \psi_i)$ that satisfies the moment restrictions, even if sample size is infinite:

$$\mathbb{E}_{i,t} \left(1 - \tilde{\beta}_i \left(\frac{c_{i,t+1}}{c_{i,t}} \right)^{-\frac{\theta_i}{\psi_i}} R_{w,t+1}^{\theta_i - 1} R_{i,t+1} \right) z_{i,t} \quad \geq \quad 0$$

  where $\theta_i = \frac{1-\gamma_i}{1-\frac{1}{\psi_i}}$ and $R_{w,t+1}$ the return to total wealth.
- Moment inequalities as an extension to conventional GMM.
- Inference is not standard but computationally attractive methods available. (See Chen, Christensen and Tamer (2018) for MCMC.)

Inference

Data

- We employ the consumption expenditures in the KNCP dataset: Monthly aggregation (Bansal, Kiku and Yaron (2016) find empirical support for monthly decision interval using aggregate data.)
- Need as much time series dimension as possible: Restrict the cross section to households that are present in the survey for at least 10 consecutive years ($\sim$ 12,500 households).

Distributions

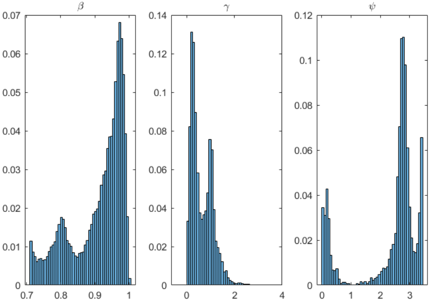

Figure: Histogram of the distribution of estimated preferences: discount factor, risk aversion and intertemporal elasticity of substitution.

Correlations

	Discount Factor	Risk Aversion	IES
Discount Factor	1		
Risk Aversion	0.080	1	
IES	0.225	-0.544	1

Table: Correlation matrix of estimated EZ preferences.

Empirical contribution

- The Marginal Propensity to Consume is an important sufficient statistic that shapes the transmission of aggregate shocks, including monetary and fiscal policy.
- We employ our estimates to bring in empirical evidence on:
  - How much of the MPC heterogeneity is explained, on average, by the ex-ante heterogeneity.
  - How do preferences affect the the MPC.
  - How our results complement other findings in the literature.

The 2008 Tax Rebate Survey

- Respondents were asked about the dollar amount of their tax rebate (stimulus payment) and then to report their MPC (the extra amount they are spending on consumer goods) in response to this rebate.
- We focus on the households that have at least 10 consecutive years of reported consumption data (12,519) and match to those households that reported receiving or going to receive the tax rebate. We end up with 2,159 households.

The 2008 Tax Rebate Survey

6. What was the dollar amount of this tax rebate (stimulus payment)?
11. Please think about the extra amount you are spending because of this rebate. How much (in dollars rounded to the nearest dollar) are you spending on each of the following:
    - Food, health and beauty aids, and household products
    - Entertainment or personal services, such as restaurant, vacations, and movie tickets
    - Durable goods such as appliances, electronics, and furniture
    - Clothing, shoes, or accessories
    - All other types of purchases

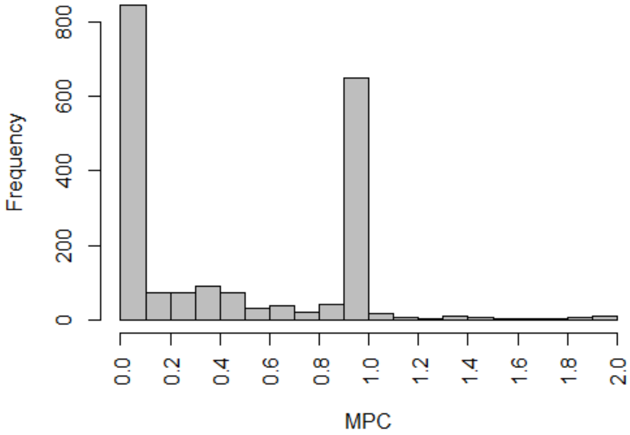

Figure: Histogram of the distribution of reported MPC, 2008

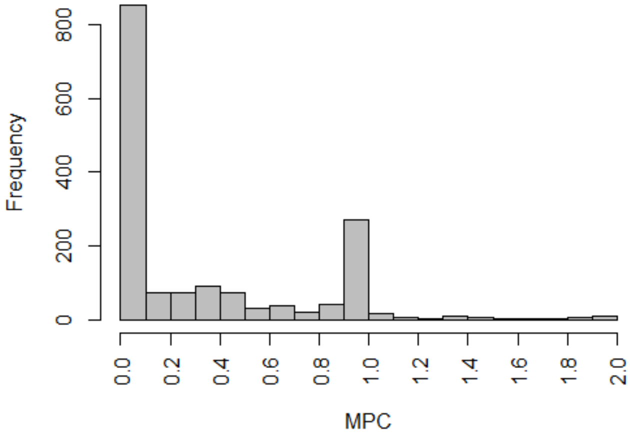

Figure: Histogram of the distribution of reported MPC, 2008, without MPC=1 if reporting that they are mostly saving/paying off debt

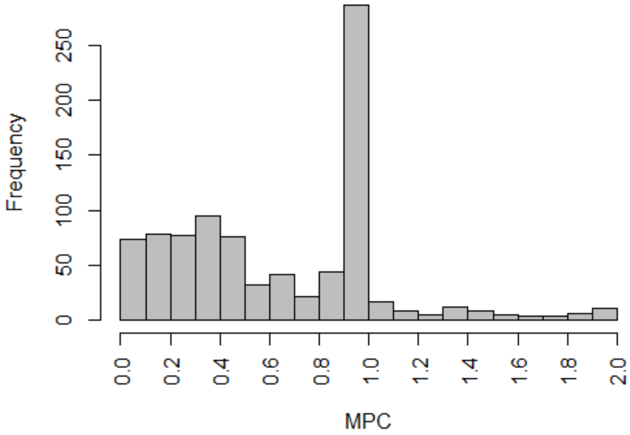

Figure: Histogram of the distribution of reported MPC positive values, 2008, without MPC=1 if reporting that they are mostly saving/paying off debt

We consider the following Bayesian Additive Regression Trees (BART) model for the MPC:

$$MPC_i^* = f(\hat{\vartheta}_i^*) + e_i, \qquad e_i \overset{\text{iid}}{\sim} N(0, \sigma^2) \tag{1}$$

- $*$ observed characteristics have been regressed out from the variables
- f is represented as the sum of many regression trees
- $\hat{\vartheta}_i = (\hat{\beta}_i, \hat{\gamma}_i, \hat{\psi}_i)$ are the median of the estimated preferences that correspond to the i^{th} household.

- Sampling weights are used to make the sample representative of US population.
- We control for the effect of wealth on the MPC, by focusing on the (liquidity) unconstrained households.

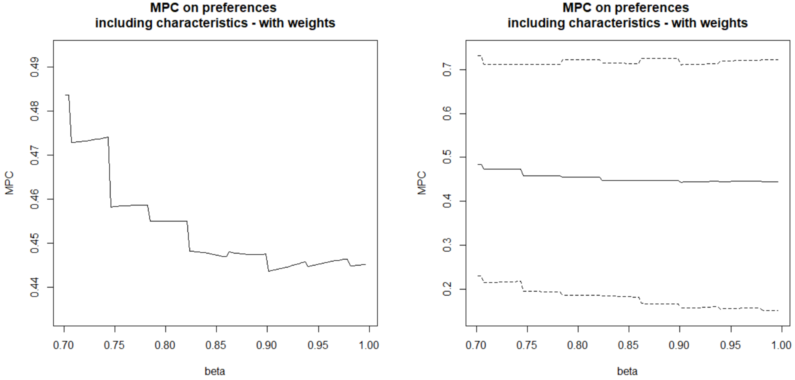

Figure: The marginal effect of discount factor on MPC while aggregating over the other preferences.

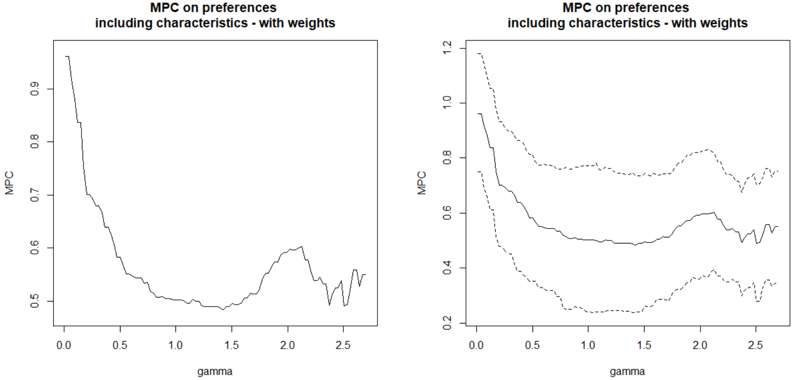

Figure: The marginal effect of risk aversion on MPC while aggregating over the other preferences.

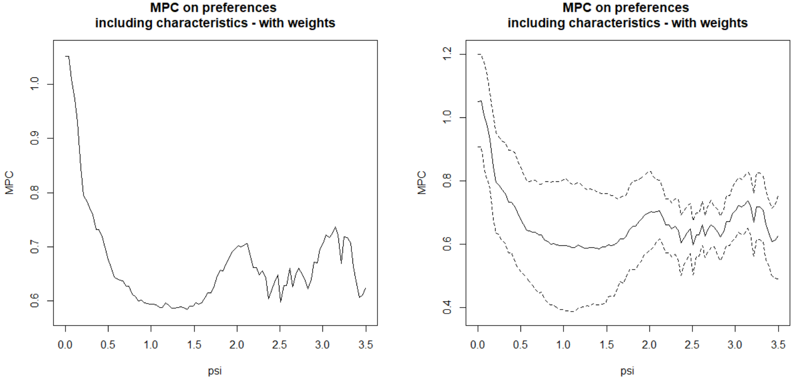

Figure: The marginal effect of intertemporal elasticity of substitution on MPC while aggregating over the other preferences.

Latent Heterogeneity in MPC

- In our sample the observed characteristics explain 5% of the MPC. The preferences using BART model contribute to 3pp additional variance explained.
- Low expailed variance $\rightarrow$ a lot of MPC heterogeneity remains unexplained.
- Same feature exists in almost all relevant studies with $R^2 \sim 1\%$-15%.

Conclusions

- We make a methodological contribution on the identification of the distribution of preferences.
- By being robust to the presence of liquidity constraints, we are able to consider all households in a representative sample.
- Controlling for household characteristics, we find that the MPC decreases with increasing patience (discount factor) and risk-aversion while the MPC rises with IES when IES is higher than 1.
- We contribute to the debate on how much of latent heterogeneity in the MPC can be explained by key preference parameters.

Questions?

Thank you for your attention!

Set Valued Preferences - Inference

- The joint (quasi) posterior of (α, ϑ) can be written as:

$$\begin{aligned} & p_{N,T}(\alpha, \{\vartheta, U\}_{i=1..N} \mid \mathcal{Y}_{N,T}) & (2) \\ = \; & p\left(\alpha \mid \{\vartheta\}_{i=1..N}, \mathcal{Y}_N^{T=2008}\right) p\left(\{\vartheta, U\}_{i=1..N} \mid \mathcal{Y}_{N,T}\right) & (3) \\ = \; & p\left(\alpha \mid \{\vartheta, U\}_{i=1..N}, \mathcal{Y}_N^{T=2008}\right) \prod_{i=1..N} p\left(\vartheta_i, U_i \mid \mathcal{Y}_T^i\right) & (4) \end{aligned}$$

where $p(\vartheta_i, U_i) \propto \pi(\vartheta_i, U_i) e^{-TQ_T(\vartheta_i, U_i)}$

- The algorithm of Chen, Christensen and Tamer (2018) uses the CU-GMM criterion

$$Q_T(\vartheta_i, U_i) = \frac{1}{2}(\bar{m}(y_{i,t,t+1}, Y_{t,t+1}, \vartheta) - U_i)^T V^{-1}(\bar{m}(y_{i,t,t+1}, Y_{t,t+1}, \vartheta) - U_i)$$

to obtain draws of partially identified parameters ϑ_i.

Identification