Commitment and the Dynamics of Household Labor Supply

– new tests and evidence from Europe –

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Introduction

- The extent to which individuals commit to their partner for life has important implications
- Large amounts of commitment necessary for:
  - investing in common assets
  - producing goods at home efficiently
  - pooling risk across family members
- Limits to commitment typically:
  - induce investments in private assets
  - prevent spouses from economically exploiting each other
  - ultimately offer a way out from a bad marriage

Broad question

- What can we learn from observed behavior about commitment?

Repeated interactions

- Consider two or more parties who repeatedly share risk:
  - **village households** who transfer goods or income among them
    e.g. Coate and Ravallion 1993, Kocherlakota 1996, Ligon et al. 2002
  - **workers** who supply labor and **firms** that offer employment
    e.g. Thomas and Worrall 1988, Beaudry and DiNardo 1991
  - **agents** who trade assets
    e.g. Kehoe and Levine 1993, Alvarez and Jermann 2000
  - **spouses** who offer each other intra-household insurance
    e.g. Mazzocco 2007, Lise and Yamada 2019
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- Ability of parties to commit to some future behavior is crucial
- Models involving a dynamic decision process must rely on specific assumptions about commitment
  - behavioral predictions will depend on such assumptions
  - e.g. analyze impact of **targeted cash transfers**: we cannot ignore limitations from spouses' ability to commit

What we do

1. Dynamic collective model to characterize behavior in three commitment alternatives – three gradually weaker efficiency assumptions:
   - full commitment FC
   - limited commitment LC
   - no commitment NC

▸ literature

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   - **Theloudis et al. 2025, EJ:**
     test for FC and NC, reject both using PSID data
   - **this paper:**
     test for FC, stronger test for NC, reject both using EU-SILC data
     novel test for LC, fail to reject in EU-SILC data

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1.
Lifecycle household model

Setting

- **Lifecycle collective model**, forward-looking spouses subject to idiosyncratic individual income risk $\rightarrow$ scope for **risk sharing**
- Two spouses subscripted by $j = \{1, 2\}$ get married at $t = 0$
  - each enjoys utility from joint consumption q_t and disutility from work h_{jt}
  - each spouse's period utility is $u_j(q_t, h_{jt})$; concave, continuous
  - easy extensions to home production, joint leisure, private consumption...

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- Couple's sequential budget constraint in period t:

$$(1 + r)a_t + \tau(y_t) = q_t + a_{t+1}$$

  - a_t common assets
  - $\tau(y_t)$ disposable income, where $y_t = \sum_j w_{jt} h_{jt}$
  - w_{jt} (wage) is the price of hours h_{jt}

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- At marriage $t = 0$, the spouses solve:

$$\max_{\{q_t, h_{jt}, a_{t+1}\}_0^{\bar{t}}} \mu_1(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_1(q_t, h_{1t}) \right) + \mu_2(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_2(q_t, h_{2t}) \right)$$

  subject to budget constraint $\forall t$

- $\mu_j(\Theta_0)$ is the **Pareto weight** at marriage on each person's utility
  - Θ_0 includes variables known or predicted at time of marriage

Limited commitment

- The spouses have **outside options**, e.g. divorce, non-cooperation
- The spouses have same objective function:

$$\max_{\{q_t, h_{jt}, a_{t+1}\}_0^{\bar{t}}} \mu_1(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_1(q_t, h_{1t}) \right) + \mu_2(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_2(q_t, h_{2t}) \right)$$

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subject to budget constraint $\forall t$, and

individual rationality constraints, **for** $j = 1, 2$ **and all** $t \geq 1$

$$\underbrace{\mathbb{E}_t \sum_{\tau=t}^{\bar{t}} \beta^{\tau-t} u_j(q_\tau, h_{j\tau})}_{\substack{\text{individual inside value} \\ V_{jt}(w_{1t}, w_{2t}, a_t, \mu_{jt})}} \geq \underbrace{\max_{\{q_{j\tau}, h_{j\tau}, a_{j\tau+1}\}_t^{\bar{t}}} \mathbb{E}_t \sum_{\tau=t}^{\bar{t}} \beta^{\tau-t} \widetilde{u}_j(\widetilde{q}_{j\tau}, \widetilde{h}_{j\tau})}_{\substack{\text{individual outside value} \\ \widetilde{V}_{jt}(w_{jt}, a_t, Z_{jt})}}$$

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- Z_{jt} shifts j's outside value but leaves inside value unaffected

No commitment

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- No marital 'contract' at the start of marriage, the spouses renegotiate every period
- Similar (but not same) objective function:

$$\max_{\{q_t, h_{jt}, a_{t+1}\}_0^{\bar{t}}} \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \mu_1(\Theta_0, W_t, Z_t, a_t) u_1(q_t, h_{1t}) \right) + \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \mu_2(\Theta_0, W_t, Z_t, a_t) u_2(q_t, h_{2t}) \right)$$

subject to budget constraint $\forall t$

with $W_t = \{w_{1t}, w_{2t}\}$ wages, and $Z_t = \{Z_{1t}, Z_{2t}\}$ bargaining variables

- Underlying premise: spouses **repeatedly bargain** over marital surplus
  - $\mu_j(\Theta_0, W_t, Z_t, a_t)$ reflects prevailing circumstances at t

2.
Characterization of behavior

Recursive representation

- Behavior has a **common recursive representation** across modes, subject to restrictions in the Pareto weight and the state space

$$V_t = \max_{q_t, h_{1t}, h_{2t}, a_{t+1}} \mu_{1t} u_1(q_t, h_{1t}) + \mu_{2t} u_2(q_t, h_{2t}) + g_t(a_t) + \beta \mathbb{E}_t V_{t+1}$$

subject to budget constraint $\forall t$, and

restrictions on the Pareto weights μ_{jt}

- Term $g_t(a_t)$ reflects endogenous outside options in limited commitment, it's absent otherwise

Pareto weight

- Dynamics of the Pareto weight

FC : $\mu_{jt} = \mu_j(\Theta_0)$ ← variables **at marriage**

LC : $\mu_{jt} = \mu_{jt-1} + \nu_j(W_t, Z_t, a_t, \mu_{jt-1})$

$= \mu_j(W_t, Z_t, a_t, \mu_{jt-1})$ ← **contemporary** vars & past weight

NC : $\mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t)$ ← **contemporary** vars

▸ FC weight ▸ LC weight ▸ NC weight

- State space ▸
- Risk sharing ▸

Nesting and exclusion restrictions

- Inspect the Pareto weight, replace recursively:

$$\text{FC}: \mu_{jt} = \mu_j\left(\Theta_0\right)$$

$$\text{LC}: \mu_{jt} = \mu_j\left(W_t, Z_t, a_t, \mu_{jt-1}\right)$$

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- Nesting in terms of **sets of variables** that enter the Pareto weight
- **Current news** (i.e. shocks to w_{1t}, w_{2t}, z_{1t}, z_{2t}) do not matter for FC, but they matter for NC & LC
  - FC nested within both non-FC alternatives (Mazzocco 2007)
  - effect of current news on Pareto weight evidence against FC

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- **Historical news** (i.e. shocks to w_{1t-s}, w_{2t-s}, z_{1t-s}, z_{2t-s}, $s > 0$) do not matter for FC or NC, they matter for LC through μ_{jt-1}
  - NC nested within LC
  - effect of past news on Pareto weight evidence against NC & FC

Observed behavior

- The Pareto weight is unobserved but invoking 2nd welfare theorem:
  - variables in μ_{jt} enter **sharing rule**

FC : $h_{jt} = h_j^*\left(a_t,\ y_t,\ w_{jt}\right)$

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- Exclusion restrictions on Pareto weight become exclusion restrictions on labor supplies $\rightarrow$ formulate testable hypotheses
- **Bargaining effects** must be of the correct sign: theory disciplines how assignable distribution factors change bargaining power
  - the **partner's wage** w_{-jt} and **all past wages** enter h_{jt} exclusively through bargaining, cond. on total income y_t
  - we can test without other 'conventional' distribution factors!

Testing for bargaining effects

full commitment

- Simplest test uses **partner's wage** at t and **all past wages** at $t-1$
- **Current and past shocks do not affect outcomes**, ceteris paribus

$$1: \quad \frac{\partial h_{1t}}{\partial w_{2t}} = 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{1t}} = 0 \qquad (\textbf{current} \text{ shock, partner's})$$

$$2: \quad \frac{\partial h_{1t}}{\partial w_{1t-1}} = 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{2t-1}} = 0 \qquad (\textbf{past} \text{ shocks, own})$$

$$3: \quad \frac{\partial h_{1t}}{\partial w_{2t-1}} = 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{1t-1}} = 0 \qquad (\textbf{past} \text{ shocks, partner's})$$

- Hypothesis 1 is analogous to Mazzocco 2007
- Hypothesis 1-3 are tested in Theloudis et al. 2025 in the PSID

Testing for bargaining effects

no commitment

- **Current shocks affect outcomes, past shocks do not**

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$$1 \text{ new}: \quad \frac{\partial h_{1t}}{\partial w_{2t}} > 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{1t}} > 0 \qquad (\textbf{current} \text{ shock, partner's})$$

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- Hypothesis 2-3 tested in Theloudis et al. 2025 in the PSID
- Present paper tests 1 *new*, 2, 3: favorable cross-shocks strengthen the partner and weaken oneself $\rightarrow$ own hours increase

Testing for bargaining effects

limited commitment

- **Current and past shocks affect outcomes**

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$$2: \quad \frac{\partial h_{1t}}{\partial w_{1t-1}} < 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{2t-1}} < 0 \qquad (\textbf{past} \text{ shocks, own})$$

$$3: \quad \frac{\partial h_{1t}}{\partial w_{2t-1}} > 0 \quad \text{and} \quad \frac{\partial h_{2t}}{\partial w_{1t-1}} > 0 \qquad (\textbf{past} \text{ shocks, partner's})$$

- Favorable shocks **improve bargaining power** of recipient spouse, reducing their labor supply and increasing their partner's
  - history matters because Pareto weight has memory
- Hypothesis 1, 2, 3 is new, we test them in the EU-SILC
  - if rejected, then evidence **against** limited commitment
  - so limited commitment is testable (but unknown theoretical alternative)

Testing for bargaining effects

- Lots of '**over-identification**'
- All tests can be strengthened further by use of:
  - additional time periods (history)
  - additional distribution factors in Z
  - initial distribution factors in Θ

3.
Empirical formulation and results

Alternative paths to estimation

- Two alternative paths to estimation of policy functions h_j^*
- **Structural**: fully specify the model, estimate it
  - requires estimation of preferences together with everything else
  - solution and simulation of model very involved
- **Quasi reduced-form**: leave model partially unspecified, estimate approximated first-order conditions for hours h_1 and h_2
  - does not take a stance on preferences
  - implementation in reduced-form, no need for numerical methods

Empirical formulation of test

- We follow second approach, which entails two distinct steps:
  - log-linearization of optimality conditions for hours
  - log-linearization of general (LC) Pareto weight
- Put two parts together $\rightarrow$ estimating equation for **male** & **female** hours
- Test **presence** and **sign of effects** from current & past wages

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- Testable hypotheses translate into restrictions on linear regression coefficients on (residual) $\Delta \log w_{jt-\tau}$, for $j \in 1, 2$ and $\tau \geq 0$ ▸ wage shocks
  - likelihood ratio test for equality and sign restrictions (Wolak 1987; 1989)

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  - likelihood ratio test for equality and sign restrictions (Wolak 1987; 1989)
- Data: European Union Statistics on Income and Living Conditions (**EU-SILC**) panel, 2005–2019
  - complete data across 15 countries
  - sample: 39,804 households for 105,413 household$\times$year observations

Results

Commitment test p-values

	older hypotheses		new hypotheses	
	$\mathcal{H}_0^{\text{FC}}$	$\mathcal{H}_0^{\text{NC}}$	$\mathcal{H}_0^{\text{NC-new}}$	$\mathcal{H}_0^{\text{LC}}$
Austria	< 0.001	< 0.001	< 0.001	0.686
Belgium	0.007	0.024	0.004	0.455
Bulgaria	0.124	0.143	0.216	0.344
Cyprus	0.220	0.255	0.354	0.826
Czech Rep.	< 0.001	0.075	0.122	0.645
France	< 0.001	< 0.001	0.001	0.147
Greece	0.002	0.001	0.001	0.087
Hungary	0.061	0.066	0.110	0.989
Italy	< 0.001	< 0.001	< 0.001	0.284
Luxembourg	0.009	0.003	0.005	0.673
Poland	0.023	0.010	0.020	0.826
Romania	< 0.001	0.002	0.004	0.402
Slovakia	0.157	0.444	0.264	0.590
Spain	0.066	0.031	0.053	0.418
UK	0.498	0.381	0.492	0.486

$\mathcal{H}_0^{\text{FC}}$ and $\mathcal{H}_0^{\text{NC}}$ correspond to hypotheses in Theloudis et al. 2025; $\mathcal{H}_0^{\text{NC-new}}$ and $\mathcal{H}_0^{\text{LC}}$ are the new hypotheses developed in this paper.

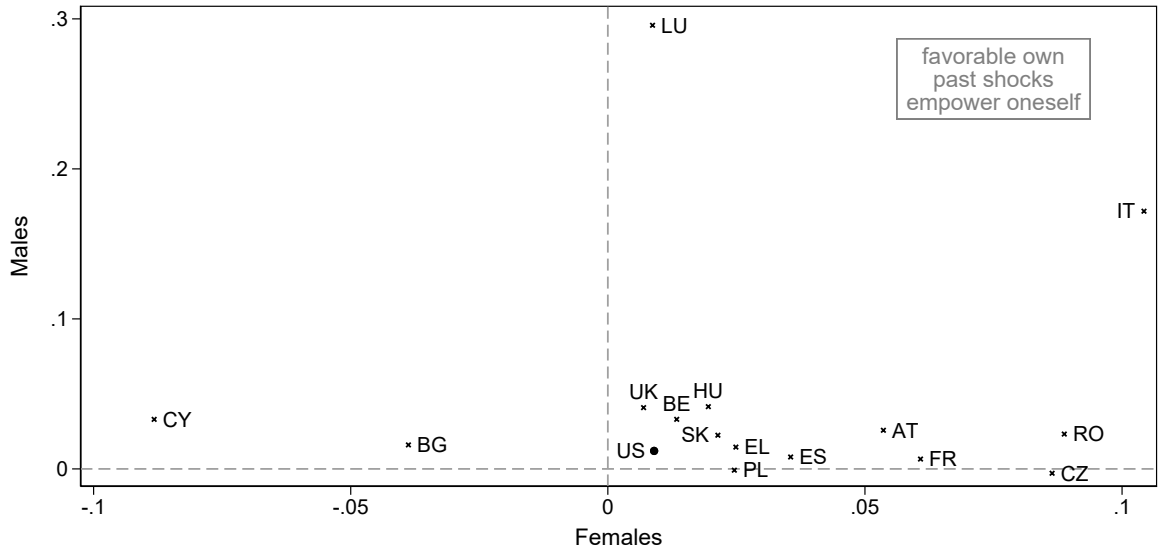
- We **reject** $\mathcal{H}_0^{\text{FC}}$ and $\mathcal{H}_0^{\text{NC}}$ in all but 4 countries
  - in line with Mazzocco 2007 (rej. FC in the US), Lise and Yamada 2019, Toriyabe 2025 (rej. FC in Japan), Theloudis et al 2025 (rej. NC in US)
- We **reject** $\mathcal{H}_0^{\text{NC-new}}$ in majority of countries
- We **do not reject** $\mathcal{H}_0^{\text{LC}}$ in any country, except for one marginal case (GR)

Results discussion

- Failure to reject $\mathcal{H}_0^{\text{LC}}$ does not reflect lack of statistical power
  - most coefficients in hours equation are significant
  - and have the sign that LC postulates
- Only countries where we arguably lack statistical power are Bulgaria, Cyprus, Slovakia, and the UK
  - hence our failure here to also reject $\mathcal{H}_0^{\text{FC}}$ and $\mathcal{H}_0^{\text{NC}}$ previously
  - yet for Slovakia and the UK, coefficients have sign postulated by LC
- Last point further corroborated by the **elasticity of the Pareto weight** with respect to own past wages

Bargaining effects

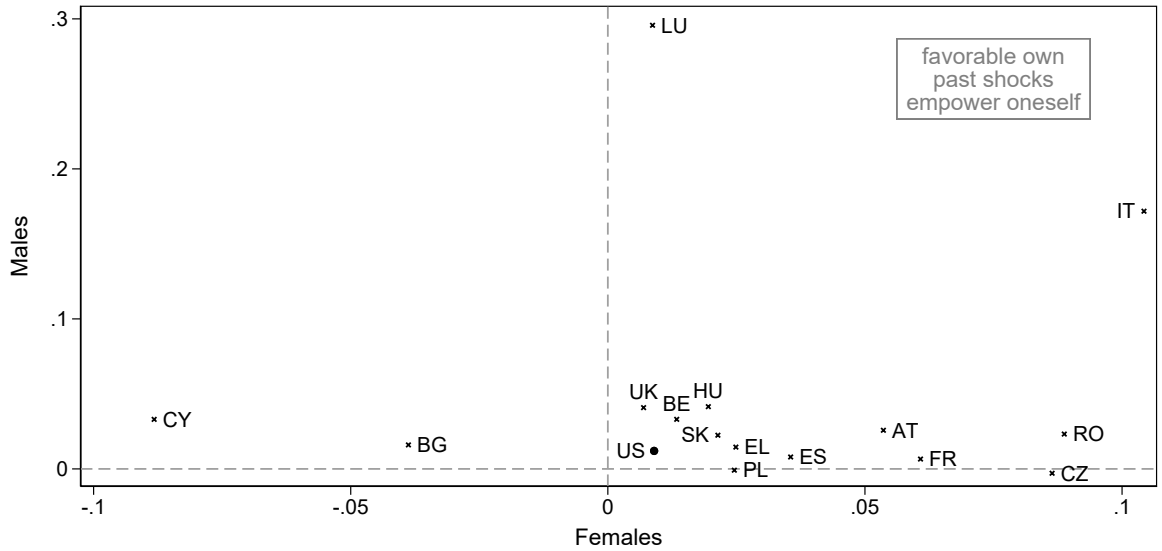
- **Elasticity of the Pareto weight** with respect to own past wages



- Elasticities in first quadrant suggest behavior consistent with LC
  - favorable shocks improve **bargaining power** of the recipient spouse

Bargaining effects

- **Elasticity of the Pareto weight** with respect to own past wages



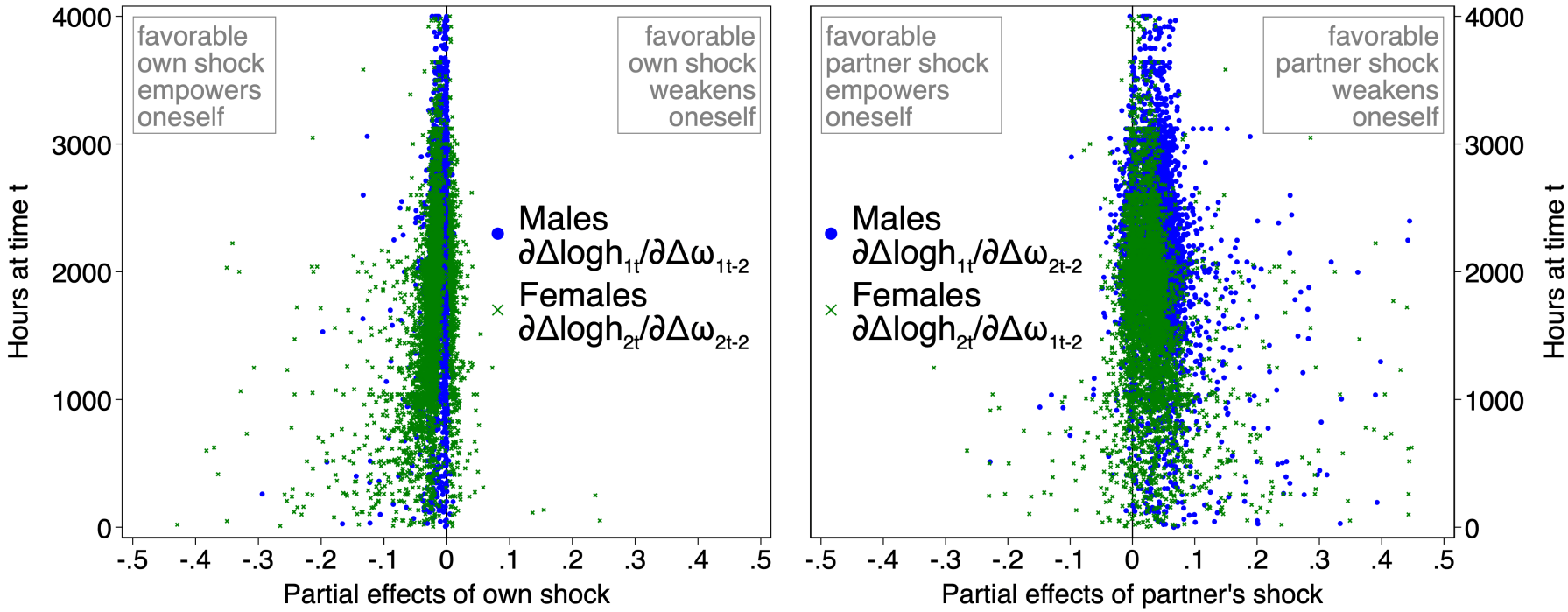
- Elasticities in first quadrant suggest behavior consistent with LC
  - favorable shocks improve **bargaining power** of the recipient spouse
  - magnitude of bargaining effect: elasticities for men and women lie between 0.00-0.10 for most countries
  - a 10% wage change in past period shifts current hours by up to 1%, exclusively through bargaining
  - bargaining effect smaller than substitution or income effects of wages

Bargaining effects

- What about results for the U.S.?
- In Theloudis et al. 2025, we reject $\mathcal{H}_0^{\text{FC}}$ and $\mathcal{H}_0^{\text{NC}}$ using the PSID
- While we do not test for LC, we calculate the bargaining effects from period $t-2$ shocks (i.e., two periods in the past)

Bargaining effects from $t-2$ wage shocks

Theloudis et al. 2025



- Bargaining effects consistent with LC – but vast heterogeneity across households
- Bargaining effects mostly in $[0.0 - \pm 0.1]$:
  10% wage shift $\rightarrow$ up to $\pm 1\%$ hours shift **due to bargaining**

Conclusions

- We characterize behavior in three alternative modes of commitment: full, limited, and no commitment
- We establish:
  - **current** and **historical shocks** affect behavior differently in each mode
  - nesting of sets of variables that matter for resource sharing in each case
- We propose test that separates, for the first time, all three alternatives
  - using the EU-SILC, we **reject full** and **no commitment**
  - we cannot reject **limited commitment**
- Test applicable to broader settings of risk-sharing

Appendix

Relation to literature

Three distinct literatures:

1. **Household behavior, in particular its intertemporal aspects**
   Apps & Rees 1988; Chiappori 1988; 1992; Lundberg and Pollak 1993; 1994; Cherchye et al. 2007; Bourguignon et al. 2009; Mazzocco 2007; Voena 2015; Chiappori and Mazzocco 2017; Fernández and Wong 2017; Low et al. 2018; Lise and Yamada 2019; Foerster 2020; Blasutto and Kozlov 2021; Reynoso 2022

2. **Commitment and contracts, in macro and development**
   Thomas and Worrall 1988; Beaudry and DiNardo 1991; Chari and Kehoe 1993; Coate and Ravallion 1993; Kehoe and Levine 1993; Kocherlakota 1996; Fafchamps 1999; Alvarez and Jermann 2000; Attanasio and Ríos-Rull 2000; Ligon et al. 2002; Mazzocco 2007; Dubois et al. 2008; Adams et al. 2014

3. **Labor, response of labor supply to wages**
   Lundberg 1985; Hyslop 2001; Blundell et al. 2008; Bellou and Kaymak 2012; Blundell et al. 2016; Wu and Krueger 2021

Relation to literature

contribution related to literature #1

- Articles select a priori the commitment technology available to agents: their conclusions are conditional on that choice
- By contrast, we take a step back and **test** for the extent of commitment in married couples
- Closest papers to ours: seminal Mazzocco 2007
  - tests for **full** against **non-full** commitment, based on role of current news
- We propose test that **distinguishes between all three** alternatives based on joint role of current and historical information
  - our test is not only about presence of effects from current & past news
  - unlike Mazzocco 2007, our test is also about the sign of such effects that is strictly disciplined by theory

Relation to literature

contribution related to literature #2

- Large macro and development literatures that characterize transfers without commitment
- Mazzocco 2007; Adams et al. 2014 do similarly in a household context without, however, considering all three regimes we consider here
- By contrast, we **contrast all three regimes**
  - behavior exhibits distinctive features in each case
  - we clarify the common confusion that no and limited commitment can be modeled in an interchangeable way

Relation to literature

contribution related to literature #3

- Labor economics literature on the labor supply response to wages, particularly to the partner's wages (**added worker**)
- We focus not only on responses to current wages, but also on **dynamic responses** to spousal wages multiple periods in the past
- Our empirical exercise can thus be seen as: one that investigates the **dynamic effects** of current and past wages on family labor supply

Full commitment

- Pareto weight determined at marriage as function of initial bargaining variables Θ_0 and remains **constant** over time
  - this is an implication of first-best efficiency
- Shocks, i.e. events not contracted upon at $t = 0$, do not change the allocation of resources

$$\mu_{jt} = \mu_j(\Theta_0) \qquad \forall t$$

Limited commitment

- Pareto weight **shifts** when, due to shocks, continuation of previous allocation violates individual rationality:

$$\mu_{jt} = \begin{cases} \mu_{jt-1} \qquad \text{with } \mu_{j0} = \mu_j(\Theta_0) \\ \text{if neither spouse's IR constraint binds at } t \\ \\ \mu_{jt-1} + \nu_{jt}\left(W_t, Z_t, a_t, \mu_{jt-1}\right) \\ \text{if } j\text{'s IR binds at } t;\ \nu_{jt} \text{ the Kuhn-Tucker multiplier on } j\text{'s IR constraint} \end{cases}$$

  - spouses commit to future allocations up to point where one's IR is violated
  - otherwise efficiency requires that the constrained spouse's **weight jumps** $\rightarrow$ *indifference* between staying and leaving (Ligon et al. 2002)
  - jump depends on variables underlying IR constraint
  - this includes past μ_{jt-1} that determines j's share of marital surplus $\Rightarrow$ **history matters!**
  - positive shock to w_2: female will make partial transfer to male; transfer may be lower if male has not made similar transfers in the past

No commitment

- Pareto weight determined in each period **given prevailing information** at the time

$$\mu_{jt} = \mu_j \left(\Theta_0, W_t, Z_t, a_t\right) \qquad \forall t$$

- Weight varies continuously with new information that reveals over time
  - initial variables Θ_0 may influence type of bargaining game the spouses play
- Continuous response to new information is implication of repeated bargaining

State space

- All commitment cases obey common recursive equation of the form

$$V_t = \max_{q_t, h_{1t}, h_{2t}, A_{t+1}} \mu_{1t} u_1(q_t, h_{1t}) + \mu_{2t} u_2(q_t, h_{2t}) + g_t(a_t) + \beta \mathbb{E}_t V_{t+1}$$

  subject to budget constraint and restrictions on the Pareto weights

- Value functions:

$$\begin{aligned} V_t &\equiv V_t(X_t, W_t, a_t, \Theta_0) && \text{in Full commitment} \\ V_t &\equiv V_t(X_t, W_t, a_t, Z_t, \mu_{t-1}) && \text{in Limited commitment} \\ V_t &\equiv V_t(X_t, W_t, a_t, \Theta_0, Z_t) && \text{in No commitment} \end{aligned}$$

  where

  - X_t contingent states (exogenous state variables)
  - $W_t = \{w_{1t}, w_{2t}\}$ male and female wages (exogenous state variables)
  - a_t assets (endogenous state variable)
  - Θ_0 initial distribution factors
  - Z_t stochastic distribution factors
  - $\mu_{t-1} = (\mu_{1t-1}, \mu_{2t-1})'$ the past Pareto weight

Risk sharing in the household

- Full commitment
  - the **ratio of hours marginal utilities** is conditionally fixed over time $\rightarrow$ full risk pooling between spouses

$$\frac{\partial u_1/\partial h_1}{\partial u_2/\partial h_2} = \frac{w_1}{w_2} \times \frac{\mu_2(\Theta_0)}{\mu_1(\Theta_0)}$$

- Limited commitment
  - ratio fixed over time unless a spouse hits their participation constraint $\rightarrow$ second-best risk pooling

$$\frac{\partial u_1/\partial h_1}{\partial u_2/\partial h_2} = \frac{w_1}{w_2} \times \frac{\mu_{2t-1} + \nu_{2t}}{\mu_{1t-1} + \nu_{1t}}$$

- No commitment
  - ratio fluctuates over time $\rightarrow$ the spouses are unable to insure one another

$$\frac{\partial u_1/\partial h_1}{\partial u_2/\partial h_2} = \frac{w_1}{w_2} \times \frac{\mu_2(\Theta_0, W_t, Z_t, a_t)}{\mu_1(\Theta_0, W_t, Z_t, a_t)}$$

Linearization 1: optimality condition

1. Log-linearize **static first-order conditions** for hours h_1 and h_2:
   e.g. Blundell et al. 2016 do similarly in a unitary context

$$\Delta \log h_{jt} \approx b_0 + \boldsymbol{b}_1' \Delta(\text{taste \& wage observables}_t) + \boldsymbol{b}_2'(\text{tax terms}_t)$$
$$+ \underbrace{\gamma_1 \Delta \log w_{jt} + \gamma_2 \Delta \log q_t + \gamma_3 \Delta \log a_t + \gamma_4 \Delta \log y_t}_{\text{unitary part}}$$
$$- \underbrace{\delta_1 \Delta \log \mu_{jt}}_{\substack{\text{collective} \\ \text{part}}}$$

   - unitary part reflects substitution, income, wealth effects
   - $\delta_1 > 0$ allows us to sign the bargaining effects

- Use of static F.O.C. avoids very complicated **Euler equation**

Linearization 2: Pareto weight

2. Log-linearize **general Pareto weight** and substitute recursively
   - suppose $\exists\, z_t \in Z_t, \theta_0 \in \Theta_0$ such that each empowers spouse j

$$\Delta \log \mu_{jt} \approx \underbrace{\sum_{\tau=0}^{t-1} (e_{\mu_j,\mu_{jL}})^{\tau} e_{\mu_j,z} \Delta \log z_{t-\tau}}_{\text{cumulative growth in Pareto weight due to time-varying distribution factors}} + \underbrace{(e_{\mu_j,\mu_{jL}})^{t} e_{\mu_j,\theta} \theta_0}_{\text{initial bargaining game played by couple upon marriage}}$$

   - all elasticities vary with past levels of distribution factors
   - UNITARY model has $e_{\mu_j,\theta} = e_{\mu_j,z} = e_{\mu_j,\mu_{jL}} = 0$
   - FC has $e_{\mu_j,\theta} > 0$ and $e_{\mu_j,z} = e_{\mu_j,\mu_{jL}} = 0$
   - NC has $e_{\mu_j,\theta} > 0$ and $e_{\mu_j,z} > 0$ and $e_{\mu_j,\mu_{jL}} = 0$
   - LC has $e_{\mu_j,\theta} > 0$ and $e_{\mu_j,z} > 0$ and $e_{\mu_j,\mu_{jL}} > 0$

- Linearization implies smoothness of μ_{jt}, we discuss this in paper

Wage dynamics

- We treat **wage shocks** as exogenous, eg. Blundell et al. 2016, etc
  - difficulty in instrumenting for wages
  - estimating equations include as distinct regressors many otherwise potential instruments (for example, historical shocks)
- We do not directly observe **shocks**, so we must estimate them
- We resort to a reduced-form Mincer-style specification to account for the deterministic profile of wages (a function of $\mathbf{x}_{jt}^{w}$):

$$\Delta \log w_{jt} = \boldsymbol{\pi}_{j}^{w\prime} \mathbf{x}_{jt}^{w} + \omega_{jt}$$

  where ω_{jt} is the applicable wage shock at time t

  e.g. Meghir & Pistaferri 2004; Blundell et al. 2016; Guvenen 2007; Browning et al. 2010
- No restrictions on dynamics governing **stochastic component** ω_{jt}