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IZA DP No. 15737

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NOVEMBER 2022

ISSN: 2365-9793

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ABSTRACT

Commitment and the Dynamics of Household Labor Supply*

The extent to which individuals commit to their partner for life has important implications. This paper develops a lifecycle collective model of the household, through which it characterizes behavior in three prominent alternative types of commitment: full, limited, and no commitment. We propose a test that distinguishes between all three types based on how contemporaneous and historical news affect household behavior. Our test permits heterogeneity in the degree of commitment across households. Using recent data from the Panel Study of Income Dynamics, we reject full and no commitment, while we find strong evidence for limited commitment.

JEL Classification: D12, D13, D15, J22, J31

Keywords: household behavior, intertemporal choice, commitment, collective model, family labor supply, dynamics, wages, PSID

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* *This paper develops and supersedes our previous work in Chiappori et al. (2020). We thank seminar and conference participants in the Structural Econometrics Group at Tilburg, Essex, KU Leuven, the ISR/PSID, Porto, Wuppertal, the 2022 Barcelona Summer Forum (Income Dynamics and the Family), the 2021 SOLE and SED meetings, the Labor & Marriage Markets workshop at Aarhus, and the Cergy Gender & Family Webinar for helpful comments. We benefited from many discussions with Jaap Abbring, Richard Blundell, Jeff Campbell, Sam Cosaert, George-Levi Gayle, Krishna Pendakur, and Michèle Tertilt.

1 Introduction

Large amounts of commitment are necessary for investing in common assets, for producing goods at home efficiently, and for pooling risk across family members. By contrast, limits to commitment typically induce investments in private assets, prevent the partners from economically abusing each other, and offer a way out from a bad marriage. In this paper, we test for the extent of commitment between spouses. We develop a lifecycle collective model of the household, through which we characterize behavior in three alternative regimes: full, limited, and no commitment. We show that current and past news affect behavior differently in each case and we propose a test that distinguishes between all three. Using recent data from the PSID, we reject full and no commitment, while we find strong evidence for limited commitment with large heterogeneity across households.

Consider two or more parties who interact repeatedly sharing risk, such as spouses who offer each other intra-household insurance (Mazzocco, 2007; Lise and Yamada, 2019), village households who transfer goods or income among them (Townsend, 1994; Ligon et al., 2002), workers who supply labor and firms that offer employment (Thomas and Worrall, 1988; Beaudry and DiNardo, 1991), or agents who trade assets (Kehoe and Levine, 1993; Alvarez and Jermann, 2000). The extent to which the parties commit to some future behavior is clearly crucial. Models that help study these interactions typically involve a dynamic decision process that relies on specific assumptions about commitment; their predictions then inevitably depend on such assumptions. Consider, for instance, a cash transfer to women (e.g. Armand et al., 2020). As we show subsequently, the transfer will fail to empower women in some cases (full commitment) and thus have only limited impact on household behavior, in other cases it will empower women only temporarily (no commitment), while in yet other cases it will induce long-lasting shifts in behavior (limited commitment).

In this paper, we take a household perspective and develop a lifecycle collective model of consumption and labor supply, as in Chiappori (1988, 1992) and the dynamic versions of Mazzocco (2007) and Voena (2015). The model embeds three alternative modes of commitment in one common recursive form. At one extreme, in full commitment the spouses commit to a plan that disciplines the sharing of resources regardless of shocks that may affect them differently (e.g. Chiappori et al., 2018). At the other extreme, without commitment the spouses do not commit to any plan, so they constantly renegotiate their sharing (e.g. Lise and Yamada, 2019). In the middle lies limited commitment: the spouses commit to a plan up to the point that some shock reduces one's individual welfare below their outside option. They then renegotiate the plan or unilaterally switch to their outside option as in the case of unilateral divorce (e.g. Voena, 2015). We use the model to do three things.

First, we characterize household behavior in each commitment mode. We establish that shocks to the economic environment of the family affect behavior differently in each case. The differences manifest via the Pareto weight on each person's preferences that disciplines the sharing of marital surplus. In full commitment, shocks, whether current or past, do not affect the Pareto weight, which remains constant over time and across states of the world.[1] In limited commitment, current shocks may shift the Pareto weight if they trigger a renegotiation; this depends on the history of the couple, therefore also on past shocks, because individual welfare from marriage is a function of the past sharing of resources in the couple. In no commitment, by contrast, current shocks shift the Pareto weight continuously regardless of past shocks or circumstances. These restrictions on the Pareto weight translate into analogous restrictions on family labor supply, as we establish subsequently.

Second, we show that the set of variables that enter the full commitment Pareto weight (for which neither current nor historical information matters) is nested within the set that enters the no commitment weight (for which current information matters but historical information does not), which in turn is nested within the set that enters the limited commitment weight (for which all information matters). Thus the direction of nesting is not what one would expect by the names of the commitment regimes alone. Nesting, a common recursive form, and natural exclusion restrictions from current and historical news allows us to devise a test that, for the first time, separates the three regimes.

Our test is about the presence of effects from current and past shocks, as well as the sign of such effects. In limited commitment, contemporary shocks to distribution factors (variables that enter the Pareto weight) affect behavior in a precise way determined by the assignability of the shock and the behavioral margin itself. Consider a cash transfer to women. If it triggers a renegotiation, the female Pareto weight should increase, raising her leisure and reducing her labor supply. By contrast, the male weight would decrease, reducing male leisure and increasing his labor supply. These asymmetric effects reflect a power shift in the couple, where favorable news empower its recipient and simultaneously weaken their partner. The renegotiation, however, depends on the individual welfare from marriage today, which depends positively on the Pareto weight *until* today, which is itself determined by previous renegotiations. Therefore, the Pareto weight has memory and *past* shocks to distribution factors matter for current behavior in the same asymmetric way between spouses as current shocks do. By contrast, history does not matter in no commitment and past shocks are bygones. Neither current nor past shocks matter in full commitment.

Third, we confirm that wages enter the Pareto weight naturally even though they are

[1] Efficiency requires the opportunities created by shocks be exploited. Behavior adjusts in full commitment, albeit in a way that preserves the relative sharing of resources. This will become clearer below.

not conventional distribution factors (they also affect the budget set). We show that their bargaining effects (effects *through* the Pareto weight) are distinguishable from conventional income and substitution effects and can thus be used to test for commitment. This is appealing because wages are more easily available in household data than conventional distribution factors, they are assignable, and they typically vary considerably over time.

We implement our test empirically in a sample of married couples from the Panel Study of Income Dynamics in the US over the last two decades. Our outcome of interest is individual labor supply in the household while our main source of shocks to the family is male and female wage shocks. Our primary empirical exercise can thus be seen as one that investigates the dynamic effects of (current and past) wages on family labor supply. In a secondary set of results, we also explore shocks to anthropometric attributes.

We consistently reject full and no commitment. By contrast, we find strong evidence for limited commitment. Favorable shocks reduce one's own labor supply *and* increase the partner's; this is *simultaneously* true for current *and* historical shocks from multiple periods, precisely as limited commitment postulates. These effects, which cannot be explained on the basis of substitution, income, wealth, or tax adjustments, are consistent with power shifts in which favorable shocks improve the bargaining power of the recipient spouse. History matters under limited commitment, so shocks that shifted past bargaining power have lasting effects on behavior in a very specific way. This is exactly what we find in the data.

The simplest form of our test can be implemented fairly easily in *reduced form*, without parameterizing or estimating individual preferences. This is possible through an approximation of the problem's optimality conditions, as in Blundell et al. (2016). This approach is appealing because, on one hand, the test does not rely on a specific functional form for utility and, on the other hand, it can help quickly inform about commitment without simulating a rather involved dynamic model. However, estimation of parts of the *underlying structure* permits and reveals large heterogeneity in the degree of commitment across households. The overall evidence for limited commitment masks in fact that many couples exhibit full commitment (null bargaining effects), while others strongly exhibit limited commitment.

This paper contributes to the literature on household behavior and, in particular, to its intertemporal aspects. Bargaining and in particular collective models have recently become the norm in this literature. Voena (2015) develops a limited commitment labor supply model to study the impact of unilateral divorce. Fernández and Wong (2017) have a similar goal, though their choice of model is one of no commitment. Chiappori et al. (2018) develop a full commitment labor supply model to study the labor and marriage market implications of education choice. Lise and Yamada (2019) use a time use model with no commitment to study resource sharing. Foerster (2020) builds a household model with limited commitment to study how alimony affects parents' welfare.[2] While these excellent works select a priori the commitment technology available to agents (so their conclusions are conditional on that choice), we take a step back and *test* for the extent of commitment in married couples. As such, the closest paper to ours is the seminal work of Mazzocco (2007), who tests for full against non-full commitment based on whether current news affect behavior. He finds evidence for this and rejects full commitment. While this is often seen as evidence for limited commitment, in reality his test cannot separate no from limited commitment. By contrast, the test we propose distinguishes between all three alternatives based on the additional role of historical information. Our test is not only about the presence of effects from current and past news but also, unlike Mazzocco (2007), about the sign of such effects that is strictly disciplined by theory. Our test is thus much stronger than the earlier one.[3]

The test is motivated by our characterization of behavior across commitment modes. As such, the paper also relates to the macro and development literatures that characterize transfers without commitment, e.g. Coate and Ravallion (1993), Kocherlakota (1996), Ligon et al. (2002), Dubois et al. (2008). Mazzocco (2007) and Adams et al. (2014) do similarly in a household context without, however, considering all three regimes we consider here.[4] We show that behavior exhibits distinctive features in each case and clarify the common confusion that no and limited commitment can be modeled in an interchangeable way.[5]

The paper is finally related to the literature in labor economics that concerns the labor supply response to wages, particularly to the partner's wages, as in Lundberg (1985) and Hyslop (2001); Bellou and Kaymak (2012), Blundell et al. (2016) and Wu and Krueger (2021) are recent contributions. Our distinctive feature is the focus not only on responses to current wages but also on dynamic responses to spousal wages multiple periods in the past.

The paper develops as follows. Section 2 presents the model in the three commitment regimes and provides the characterization of household behavior. Section 3 presents the test for commitment, section 4 discusses the empirical implementation, and section 5 shows the results. Section 6 discusses some extensions and section 7 concludes.

[2]Bronson (2014) and Mazzocco et al. (2014) use lifecycle models with limited commitment to study education choices and household specialization respectively; Goussé et al. (2017) study home production without commitment; Low et al. (2018) study welfare reforms with limited commitment; Blasutto and Kozlov (2021) and Reynoso (2022) model limited commitment to explore the implications of unilateral divorce for cohabitation and the marriage market respectively. Chiappori and Mazzocco (2017) review the literature.

[3]Other tests include Townsend (1994) in the context of risk sharing in village economies, and Blau and Goodstein (2016) in a household context. Lafortune and Low (2020) show theoretically and empirically that home ownership affects the degree of commitment.

[4]The characterization of (static) collective behavior goes back to Chiappori (1988), Chiappori and Ekeland (2006), and Cherchye et al. (2007).

[5]Our paper is also related to an expanding family literature in macroeconomics; see Doepke and Tertilt (2016) and Greenwood et al. (2017) for excellent reviews.

2 Household lifecycle behavior

The setting through which we study commitment is a lifecycle collective model, in which forward-looking spouses make consumption and time allocations subject to idiosyncratic individual wage risk. Therefore, there is scope for risk sharing between them. In all that follows, lowercase letters represent model parameters, functions, and individual variables, while bold and upper case letters represent sets of variables.

A household consists of two individuals, a male and a female, respectively subscripted by $j \in \{1, 2\}$. The individuals get married at time $t = 0$ and live for $\bar{t}$ periods. In each period $t \in \{0, \dots, \bar{t}\}$ and state of the world $\boldsymbol{\omega}_t \in \Omega_t$, each person enjoys utility from joint consumption q_t and disutility from labor hours h_{jt}, as per individual preferences $u_j(q_t, h_{jt}; \boldsymbol{\xi}_{jt})$. We assume that u_j has continuous first and second partial derivatives with $u_{j[q]} > 0$, $u_{j[h]} < 0$ (disutility of work), $u_{j[qq]} < 0$ and $u_{j[hh]} < 0$ (concavity), and the signs of $u_{j[qh]}$ and $u_{j[hq]}$ determined by the nature of the consumption-hours complementarity. $\boldsymbol{\xi}_{jt}$ is a vector of taste shifters such as education or the (possibly stochastic) presence of non decision-making children.

The price of an hour of market labor is given by the individual wage w_{jt}, while the market price of consumption is normalized to 1. The couple's budget constraint in period t, common across all three commitment alternatives, is given by

$$(1 + r)a_t + \tau(y_t; \boldsymbol{\psi}_t) = q_t + a_{t+1}, \tag{1}$$

where a_t is common financial assets at the start of the period and r is the deterministic market interest rate.[6] τ maps before-tax household earnings $y_t = w_{1t}h_{1t} + w_{2t}h_{2t}$ into disposable income y_t^D. It accounts for joint taxation and benefits (e.g. EITC, food stamps), which depend on household characteristics $\boldsymbol{\psi}_t$ (e.g. presence of young children).[7]

Let $X_t = \{\boldsymbol{\xi}_{1t}, \boldsymbol{\xi}_{2t}, \boldsymbol{\psi}_t\}$ include all individual and household characteristics that affect preferences or the budget set, some of which may be stochastic (e.g. fertility). Let $W_t = \{w_{1t}, w_{2t}\}$ be the set of stochastic wages. We assume the spouses hold identical beliefs about future stochastic elements whose distributions are all known.

In order to characterize behavior in the three commitment modes in the simplest possible way, our baseline model abstracts from home production. Leisure and labor supply are thus related one-to-one, which is why we replace leisure with labor hours in the utility function. The extension to home production is straightforward and we discuss it in section 6.

[6] The extension to risky assets is straightforward and does not affect the subsequent discussion. Assets in marriage are jointly held reflecting the community property regime in the US (Mazzocco, 2007).

[7] $\boldsymbol{\psi}_t$ may have common elements with the taste shifters $\boldsymbol{\xi}_{jt}$.

2.1 Commitment modes

The next three subsections present the collective model in different commitment alternatives. For now, we disregard divorce and assume spouses remain married for the whole observation period (equivalently, we model behavior conditional on continued marriage). Divorce will be discussed in section 2.4.

2.1.1 Full commitment

Upon marriage, the individuals commit fully to all future but state-contingent allocations of resources between them. In other words, they commit at $t = 0$ to a plan that disciplines their actions in the future. Choices made under full commitment are therefore ex ante efficient and can be represented by the solution to the following problem at $t = 0$:

$$V_0^{\mathrm{FC}}(\Omega_0) = \max_{\{C_t\}_{0 \le t \le \bar{t}, \boldsymbol{\omega}_t \in \Omega_t}} \mu_1(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_1(q_t, h_{1t}) \right) + \mu_2(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_2(q_t, h_{2t}) \right) \quad (2)$$

subject to the budget constraint (1) $\forall t, \boldsymbol{\omega}_t$,

where $C_t = \{q_t, h_{1t}, h_{2t}, a_{t+1}\}$ is the set of household choice variables in period t. We do not explicitly show the dependence on the states of the world $\boldsymbol{\omega}_t \in \Omega_t$ to ease the notation. For similar reasons, we do not show the dependence of utility on the taste shifters.[8]

The Pareto weights μ_1 and μ_2 are the utility weights the household places on each person's preferences at marriage. They determine ex ante the relative allocation of resources between spouses. A relatively larger μ_1 implies that lifecycle household choices favor the male spouse while a relatively larger μ_2 implies that choices are mostly tailored to the female. Θ_0 is the set of variables that affect the Pareto weights; because the weights are determined at marriage, it follows that Θ_0 must only include information known or predicted at the time the household is formed, that is, at time $t = 0$.[9]

The expectations, common between spouses as we assume throughout, are taken over the stochastic elements of future states in Ω_t, $t > 0$, such as future wages or fertility. Generally, the state space differs across commitment alternatives. We have purposefully not defined what explicitly goes into Ω but we will return to this point in the following sections.

[8] We maintain a common discount factor between spouses; see Adams et al. (2014) for a generalization.

[9] The discussion that follows only requires that some variables known at $t = 0$ affect the Pareto weights at marriage; it does not require to specify why exactly this happens. One may think that the weights arise from a bargaining game played at marriage or from equilibrium conditions in the marriage market (e.g. Chiappori et al., 2018). In either case, information at $t = 0$ (e.g. variables summarizing the marriage market) affects the Pareto weights; we thus allow μ_1 and μ_2 to depend on Θ_0 to reflect, in reduced form, such a link.

2.1.2 Limited commitment

When an individual can unilaterally walk away from their partner (e.g. unilaterally divorce), not all future allocations are feasible in all states of the world. Certain plans may make one person better off outside the household. Assuming there is always a positive marital surplus to be shared, the household must make sure to not implement those plans.

Upon marriage, the spouses commit to future and state-contingent allocations of resources up to the point that one's marital participation constraint is violated. Choices under limited commitment are ex ante second-best efficient (ex ante efficient subject to participation constraints) and can be represented by the solution to the following problem at $t = 0$:

$$V_0^{\mathrm{LC}}(\Omega_0) = \max_{\{C_t\}_{0 \le t \le \bar{t}, \boldsymbol{\omega}_t \in \Omega_t}} \mu_1(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_1(q_t, h_{1t}) \right) + \mu_2(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_2(q_t, h_{2t}) \right) \quad (3)$$

subject to the budget constraint (1) $\forall t, \boldsymbol{\omega}_t$, and the participation constraints:

$$\nu_{jt} \ : \ \underbrace{\mathbb{E}_t \sum_{\tau=t}^{\bar{t}} \beta^{\tau-t} u_j(q_\tau, h_{j\tau})}_{\substack{\text{individual inside value} \\ \text{from marriage at } t}} \ \geq \ \underbrace{\widetilde{V}_{jt}(\Omega_{jt})}_{\substack{\text{individual outside value} \\ \text{at } t \text{ (e.g. single/divorced)}}} \qquad \forall t > 0, \boldsymbol{\omega}_t, j \in \{1, 2\},$$

where $C_t = \{q_t, h_{1t}, h_{2t}, a_{t+1}\}$ is the set of household choice variables in period t and $\widetilde{V}_{jt}(\Omega_{jt})$ is the reservation utility of person j at t, defined over $\Omega_{jt} \subseteq \Omega_t$ – more on this below.

The participation constraints, one per individual, time period, and state of the world, ensure that each person enjoys at least as much value inside their joint household as they can possibly get from their outside option, i.e. by walking away from the relationship. In other words, the participation constraints ensure individual rationality in the relationship. The constraints consist of two parts, the *inside* (left hand side) and *outside* (right hand side) values, defined on the basis of the forward-looking continuation value of each option.

The *inside* value of person j reflects the share of marital surplus that accrues to him/her given the choices made by the household in the period and state of the world. Naturally, this value varies with the applicable Pareto weight in the period/state: a larger Pareto weight on person j implies household choices more tailored to j's tastes, thus accruing a larger share of marital surplus to him/her, and vice versa. This link between the Pareto weight and the individual inside value from marriage disciplines the dynamics of the Pareto weight in limited commitment, a point to which we return in the next sections.

The *outside* value of person j reflects how he/she may fare in life outside the current relationship; its precise form depends on specific assumptions about that situation. For instance, we may, as in Voena (2015), assume that the outside option is divorce, and that the corresponding value is the present value of future expected utility of a single/divorced person – in which case we have:

$$\widetilde{V}_{jt}(\Omega_{jt}) = \max_{\{q_{j\tau}, h_{j\tau}, a_{j\tau+1}\}_{\tau=t,\ldots,\bar{t}}, \boldsymbol{\omega}_{j\tau} \in \Omega_{j\tau}} \mathbb{E}_t \sum_{\tau=t}^{\bar{t}} \beta^{\tau-t} \widetilde{u}_j(q_{j\tau}, h_{j\tau})$$
$$\text{subject to } \ (1+r)a_{j\tau} + \tau(w_{j\tau}h_{j\tau}; \boldsymbol{\psi}_\tau) = q_{j\tau} + a_{j\tau+1}, \ \forall \tau, \boldsymbol{\omega}_{j\tau}, \text{ and } a_{1t} + a_{2t} = a_t.$$

Here, we let preferences depend on marital status (i.e. $\tilde{u}_j$ may differ from u_j) to capture marital preference shifts. $\widetilde{u}_j$ may include stochastic elements that reflect, in reduced form, the utility flow from possible future remarriage or grieving following the breakup.

Other interpretations are however possible and the precise form of $\widetilde{V}_{jt}$ does not matter for the subsequent discussion. The key aspect is that $\widetilde{V}_{jt}$ is defined over the (single's) state space $\Omega_{jt} \subseteq \Omega_t$. Four distinct sets of variables enter Ω_{jt}, whose role we describe below: individual characteristics X_{jt}, the wage w_{jt}, distribution factors Z_{jt}, and marital assets a_t. The expectations are taken over the stochastic elements of future states in $\Omega_{j\tau}$, $\tau > t$.

Individual characteristics $X_{jt} \subseteq X_t$ matter for j's life as single through his/her preferences, budget set, and ultimately labor (and possibly remarriage) market future prospects. X_{jt} includes the individual taste shifters $\boldsymbol{\xi}_{jt}$, the single's tax characteristics (in principle a subset of $\boldsymbol{\psi}_t$), and possibly some characteristics of their ex-partner that codetermine alimony or child support (e.g. Foerster, 2020). Similarly, the individual wage rate w_{jt} matters for j's budget as single and his/her labor market (and possibly remarriage) prospects.[10]

Distribution factors Z_{jt} are exogenous stochastic variables that affect the singles' lifecycle prospects but not preferences or the couple's budget set conditional on household income (Bourguignon et al., 2009).[11] These variables thus affect the outside but not the inside options in the household. The difference between Z_{jt} and Θ_0 is that the former variables vary during the course of the relationship while the latter do not. As the variables in Z_{jt} vary stochastically over time/states, the single's outside value varies in response, which may make a participation constraint occasionally bind. To satisfy the constraint, the inside value of the constrained spouse must adjust, thus creating a link from the time-varying distribution factors to the choices made in the couple as we illustrate subsequently.

Upon household break-up, financial wealth accumulated during marriage is split between partners according to some fixed rule. Marital assets thus determine the wealth that a newly single possesses upon break-up, so wealth a_t enters j's outside value at t. This renders the

[10]The ex-partner's wage rate may also matter for alimony or child support. We do not explicitly show this for simplicity but the following discussion is not affected by this.

[11]Examples include the spouses' relative non-labor incomes (e.g. Thomas, 1990; Lundberg et al., 1997; Attanasio and Lechene, 2014), the sex ratio in the local marriage market (Chiappori et al., 2002), or divorce and marital property division laws (Voena, 2015).

outside options endogenous to choices made during marriage. A couple in our setting makes savings choices accounting for the implications of those choices for the outside options, in addition to the standard lifecycle/precautionary motives present also in full commitment. This is in contrast to Mazzocco (2007)'s intertemporal model, in which it is assumed that a person's wealth upon divorce is independent of wealth during marriage.[12]

2.1.3 No commitment

While full and limited commitment feature some form of commitment at marriage to a future plan (the plan contingent on the states of the world, the Pareto weights at marriage and, in the case of limited commitment, the participation constraints), no commitment features no such marital 'contract'. Upon marriage, the spouses do not commit to a future plan, that is, they do not guarantee each other a certain or minimum allocation of resources.

Without commitment, new information that arises over time changes the division of marital surplus between spouses according to the bargaining game they play. Choices under no commitment can be represented by the solution to the following problem at $t = 0$:

$$V_0^{\text{NC}}(\Omega_0) = \tag{4}$$
$$\max_{\{C_t\}_{0\le t\le \bar{t},\boldsymbol{\omega}_t\in\Omega_t}} \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \mu_1(\Theta_0, W_t, Z_t, a_t) u_1(q_t, h_{1t})\right) + \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \mu_2(\Theta_0, W_t, Z_t, a_t) u_2(q_t, h_{2t})\right)$$

subject to the budget constraint (1) $\forall t, \boldsymbol{\omega}_t$,

where $C_t = \{q_t, h_{1t}, h_{2t}, a_{t+1}\}$ is the set of household choice variables in period t.

The underlying premise of no commitment is that the spouses engage in some form of repeated bargaining over the marital surplus in a way that reflects the prevailing economic environment, captured not only by the initial variables Θ_0, but also by wages W_t, distribution factors Z_t, and wealth a_t.[13] As the prevailing circumstances change over time (i.e. as new information arises over time), a person's bargaining position shifts given the bargaining game played by the spouses. The variables in Θ_0 are fixed after marriage but they enter the Pareto weights because they may influence the type of game the couple plays.

Choices under no commitment are ex ante inefficient. This is because ex ante efficiency, at least in the first-best sense, implies that there exist no time- or state-contingent transfers that improve both spouses' expected utilities (Browning et al., 2014). This requires in turn

[12]The dependence of the outside options on wealth may move the household away from second-best efficiency; for example, the couple may overinvest in financial assets to improve their outside options. Chiappori and Mazzocco (2017) have a lengthy discussion of this as well as of an interesting opposite case.

[13]While X_t may also reflect the couple's prevailing circumstances, we assume for simplicity that it doesn't affect the Pareto weights. This is innocuous and does not affect the discussion that follows.

that the Pareto weights are the same over time/states, which is clearly not the case here. Choices are dynamically inefficient also because the bargaining weights depend on wealth. The spouse whose future weight increases more with wealth has an incentive to overinvest in assets, thus creating inefficiencies over time. Whether such inefficiency appeals to couples is ultimately an empirical question that our test for commitment helps address. Nevertheless, choices in a given period and state of the world are typically ex post efficient in the sense that they maximize a weighted sum of individual period utilities.

Our representation of no commitment (in particular why new information impacts the Pareto weights) is arguably quite abstract and lacks the precise microfoundations of full or limited commitment. Nevertheless, this abstractness enables it to be consistent with several popular underlying structures, such as resource allocations with Nash bargaining over the marriage market (Goussé et al., 2017), household sharing when labor market shocks shift the balance of power (Lise and Yamada, 2019), equilibrium allocations with bargaining over a default arrangement (Kato and Ríos Rull, 2022), and other.

2.2 Common recursive formulation

The household problem in each commitment mode is a dynamic planning problem over the allocation of resources between spouses and across periods and states of the world. Following Marcet and Marimon (2019), we can recast each problem in a common recursive form:

$$V_t(\Omega_t) = \max_{\{C_t\}_{\boldsymbol{\omega}_t \in \Omega_t}} \mu_{1t} u_1(q_t, h_{1t}) + \mu_{2t} u_2(q_t, h_{2t}) + g_t(a_t) + \beta \mathbb{E}_t V_{t+1}(\Omega_{t+1}) \tag{5}$$

subject to the budget constraint (1) $\forall \boldsymbol{\omega}_t$, and

restrictions on the Pareto weights μ_{jt}, $j \in \{1, 2\}$, defined subsequently,

with details reported in online appendix A. In each period/state, the household maximizes a weighted sum of period utilities, an appropriate continuation value, and an additional term described below. The expectations $\mathbb{E}_t$ are taken over the stochastic elements in Ω_{t+1}, given the current realization $\boldsymbol{\omega}_t \in \Omega_t$.

The additional term, $g_t(a_t)$, aggregates the singles' endogenous outside options in limited commitment. It is given by $g_t(a_t) = -\nu_{1t}\widetilde{V}_{1t}(X_{1t}, w_{1t}, Z_{1t}, a_t) - \nu_{2t}\widetilde{V}_{2t}(X_{2t}, w_{2t}, Z_{2t}, a_t)$ in limited commitment, where ν_{jt} is the Lagrange multiplier on spouse j's participation constraint at t, and by $g_t(a_t) = 0$ otherwise. $g_t(a_t)$ highlights that a couple makes savings choices in limited commitment taking into account the effect of those choices on the partners' outside options. Chiappori and Mazzocco (2017) provide a further discussion of this motive.

The solution to (5) is a set of time-consistent[14] optimal policy functions $q_t^*(\Omega_t)$, $h_{jt}^*(\Omega_t)$, $\forall j$, and $a_{t+1}^*(\Omega_t)$, which depend on the state space Ω_t in each commitment alternative. Our test for commitment relies on estimating equations derived directly from (5) and its corresponding policy functions, given restrictions that the Pareto weight imposes on the state space in each case. The crucial point in (5) is that there is a pair of applicable Pareto weights μ_{1t} and μ_{2t} in each period/state, the dynamics of which we will now characterize.

2.3 Characterization of the Pareto weight and the state space

Bargaining power is relative inside the household since the sum $\mu_{1t} + \mu_{2t}$ can be normalized to a constant. Therefore, we subsequently refer to the Pareto weight in singular. Moreover, any variable that affects one person's Pareto weight must simultaneously and mechanically enter and affect the partner's weight in the opposite direction.[15]

Full commitment. The Pareto weight is determined at marriage as a function of the initial bargaining variables Θ_0. The weight remains constant over time (so it is invariant to changes in the state of the world over time), namely

$$\mu_{jt} = \mu_j(\Theta_0), \qquad j \in \{1, 2\}, \forall t,$$

as we show in online appendix A. The variables in Θ_0 vary in the cross-section reflecting the couple's characteristics at marriage, local marriage market conditions, or other heterogeneity that the individuals base their initial bargaining on. So $\mu_j(\Theta_0)$ also varies in the cross-section of households. Θ_0 includes at least one variable $\theta_0 \in \Theta_0$ that improves j's initial bargaining power ($\partial\mu_j/\partial\theta_0 > 0$) and, consequently, worsens that of the partner ($\partial\mu_{-j}/\partial\theta_0 < 0$). These bargaining variables remain fixed for $t > 0$ after marriage, so $\mu_j(\Theta_0)$ also remains fixed within a given family over time. The initial weight at marriage thus serves as the spouses' intra-household bargaining power over their entire lifecycle.

The time and state invariance of the Pareto weight (conditional on Θ_0) is a well-known implication of first-best efficiency (Browning et al., 2014). Intuitively, once the initial bargaining weight is set at marriage, future shocks (for example, shocks to wages) do not change the allocation of marital surplus between spouses, who fully share any idiosyncratic risk between them. Of course efficiency requires that the spouses exploit the economic opportunities that arise from variation in wages or other shocks; but with full commitment, those effects remain compatible with ex ante efficiency and the Pareto weight does not change in response.

[14] The policy functions depend on time because the horizon is finite.

[15] One can show this formally by explicitly including the restriction $\mu_{1t} + \mu_{2t} = \textit{constant}$ in program (5).

This implies that policies that seek to empower, say, women, e.g. cash transfers targeted to women, cannot affect the division of marital surplus if they are implemented after marriage. The only policies that matter under full commitment are those that affect Θ_0.

Limited commitment. The Pareto weight is given by:

$$\begin{aligned} & \mu_{jt} = \mu_{jt-1} + \nu_{jt}, && j \in \{1,2\}, \forall t > 0, \\ \text{with} \quad & \mu_{j0} = \mu_j(\Theta_0), && j \in \{1,2\}, \end{aligned}$$

where ν_{jt} is the Lagrange multiplier on spouse j's participation constraint at t. The derivation is in online appendix A. The Pareto weight shifts when the continuation of the previous allocation of resources, summarized by the past weight μ_{jt-1}, violates a person's participation constraint. In such case, the constrained spouse's weight jumps by $\nu_{jt} > 0$, i.e. the Lagrange multiplier on the binding constraint. If no participation constraint binds, then $\nu_{jt} = 0$, and the Pareto weight remains unchanged. Whether a participation constraint binds depends on the variables underlying the constraint, so we may write $\nu_{jt} \equiv \nu_j(W_t, Z_t, a_t, \mu_{jt-1})$ as we explain below.[16]

Consider the distribution factors. As $Z_t = \{Z_{1t}, Z_{2t}\}$ shift the outside options, a person's participation constraint may bind for some realization of Z_t. To relax the constraint, the constrained person's bargaining power increases by ν_{jt}, which shifts household decisions towards her preferences and improves her inside value. The increase in power is the smallest possible that makes j indifferent between staying in the relationship and leaving. This follows from second-best efficiency as analyzed in Kocherlakota (1996) and Ligon et al. (2002).[17]

Wages also impact the participation constraints, though their workings are more nuanced. While $Z_{jt} \subseteq Z_t$ typically includes at least one variable $z_{jt} \in Z_{jt}$ that improves j's outside option, increases her bargaining power ($\partial\mu_{jt}/\partial z_{jt} > 0$) and symmetrically worsens the partner's ($\partial\mu_{-jt}/\partial z_{jt} < 0$), wages simultaneously affect j's outside *and* inside values. An increase in $w_{jt} \in W_t$, however, should improve j's outside value more, because any value from wages inside the relationship must be shared with her partner. As her participation constraint may thus bind, we expect $\partial\mu_{jt}/\partial w_{jt} > 0$ and, in turn, $\partial\mu_{-jt}/\partial w_{jt} < 0$. The wage w_{jt} also affects the *partner's* inside value through sharing; a wage rise loosens the partner's constraint while a wage cut tightens it (both income effects), so $\partial\mu_{-jt}/\partial w_{jt} < 0$ like above.

[16] To ease the notation, we assume from now on that changes in demographic characteristics X_t affect a person's inside and outside values similarly. Therefore, one can omit X_t in the participation constraints.

[17] Recall that the present analysis is conditional on the spouses remaining married. This implies that at most one participation constraint can bind in a given period/state (Kocherlakota, 1996). It also implies that, following the increase in person j's power, there exists a feasible allocation at which her partner's constraint is also satisfied and the couple remains married.

Wealth a_t also enters the participation constraints; but it does not clearly favor one party unless policies or explicit agreements dictate this (e.g. prenuptial contracts).

The extent to which a participation constraint binds in response to Z_t or W_t depends on the person's inside value, which, as we established earlier, varies with the applicable Pareto weight. Suppose μ_{jt-1} is the Pareto weight at the *start* of period t, after the state of the world manifests but before decisions are made in the period. A relatively larger μ_{jt-1} implies a relatively larger share of marital surplus for j, thus making her outside option less desirable for a given realization of Z_t or W_t; and vice versa. So whether j's constraint binds at the *start* of period t depends on μ_{jt-1}. Consequently, ν_{jt} and the updating of the Pareto weight upon decision making later on in the period also depend on it.

Where does μ_{jt-1} come from? The nature of decision making is such that the participation constraints are always satisfied at the updated μ_{jt} at the *end* of the period. No further updating takes place before decision making in the *following* period, therefore μ_{jt} at the *end* of t is also the applicable weight at the *start* of $t+1$. By deduction, μ_{jt-1} is therefore the weight that materialized at the *end* of $t-1$. By the time of decision making in period t, μ_{jt-1} summarizes the history of the household through binding past constraints and renegotiations, which is an artifact of the recursive nature of the participation constraints. Intuitively, a given shock that improves j's outside option will not trigger a renegotiation if j has been 'happy' inside her relationship, that is, if she has historically earned a 'good' share of the marital pie. So certain states of the world trigger renegotiation in certain histories but not in other. History is summarized by a single variable, μ_{jt-1}, and conditional on it, older information does not matter for decision making today (Kocherlakota, 1996).

This step-like movement of the Pareto weight in response to binding participation constraints is a well-known feature of limited commitment (Mazzocco, 2007). The couple commits to the resource allocation enacted at marriage for as long as the participation constraints remain slack. Therefore, a given allocation and Pareto weight can be quite persistent. The spouses thus fully share risk up to the point when a renegotiation takes place to satisfy a constrained spouse. After the renegotiation, the new weight may itself persist until another constraint binds depending on the state of the world and history. The Pareto weight thus varies cross-sectionally but also longitudinally, *within* a given family, following shocks to the state of the world over time. Policies that seek to empower women, e.g. targeted cash transfers, can thus be implemented during the relationship and may have lasting effects on the balance of power if they successfully improve women's outside options. Persistence and history are features of limited commitment that we subsequently exploit for testing.

No commitment. The Pareto weight is determined in each period given the prevailing information (i.e. the state of the world) in the period; by construction, it is given by

$$\mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t), \qquad j \in \{1, 2\}, \forall t.$$

The Pareto weight varies with the initial bargaining variables Θ_0, which influence the type of bargaining game the spouses play. It also varies continuously with new information that reveals over time, i.e. with shifts in the state of the world summarized by wages and distribution factors, the bargaining effects of which are typically assignable, and assets. For example, an increase in $w_{jt} \in W_t$ should empower spouse j ($\partial\mu_{jt}/\partial w_{jt} > 0$) and simultaneously weaken her partner ($\partial\mu_{-jt}/\partial w_{jt} < 0$). How precisely this is done depends on the exact bargaining game on which no assumption is made beyond ex post efficiency.

The continuous response of the Pareto weight to contemporaneous information is a well-known feature of no commitment and repeated bargaining (e.g. Lise and Yamada, 2019). The main implication is that the spouses cannot share risk efficiently as they cannot commit to transfer resources from one period to another. This lack of history, at least conditional on assets, makes the Pareto weight transitory in nature. It implies that policies that seek to empower women may be implemented during the relationship (e.g. by improving elements in W_t or Z_t that are assignable to women) but their effect is temporary. As soon as the policy disappears and the world reverts to some default state, any gains in the Pareto weight also disappear. This absence of history is a feature of no commitment that we exploit for testing.

The policy functions derived from (5) vary with individual and household characteristics X_t, wages W_t, and assets a_t. These variables affect preferences and/or the budget set in all commitment modes and, through them, the optimal trade-off between consumption, savings, leisure and work. The policy functions also vary with the applicable Pareto weight μ_{jt}. In all commitment alternatives, a relatively larger μ_{jt} implies period t choices that favor spouse j while a relatively lower μ_{jt} implies choices that are mostly tailored to her partner. Consequently, the state space is given by

$$\Omega_t = \{X_t, W_t, a_t, \mu_{jt}\},$$

common across commitment modes.[18] However, each commitment alternative imposes different restrictions on μ_{jt}. For example, μ_{jt} in full commitment is exclusively determined by the initial bargaining variables Θ_0. We may thus replace μ_{jt} in the state space with Θ_0. Consequently, the full commitment state space is given by $\Omega_t = \{X_t, W_t, a_t, \Theta_0\}$. By a similar argument, the limited commitment state space is given by $\Omega_t = \{X_t, W_t, a_t, Z_t, \mu_{jt-1}\}$

[18] In practice, only one person's weight enters the state space because of the restriction $\mu_{1t}+\mu_{2t} = constant$.

while the no commitment state space by $\Omega_t = \{X_t, W_t, a_t, \Theta_0, Z_t\}$. We show subsequently that these sets are actually nested, which enables us to test for the type of commitment.

2.4 Divorce

A final remark concerns divorce, from which we have purposefully abstracted so far. In all three commitment modes, we can let divorce occur optimally. This will be the case, for instance under limited commitment, when one spouse's participation constraint binds but no feasible allocation can satisfy it without violating the other spouse's constraint.

Different assumptions exist in the literature about the allocation of assets upon divorce or the spouses' post-divorce welfare. For instance, one may assume that the division of assets is exogenously determined by the legal system (e.g. Voena, 2015); alternatively, it may be specified by some prenuptial agreement, which may or may not be optimally designed. Similarly, one may assume that ex-spouses go their separate ways; or they may remain related through future joint decisions (e.g. regarding children, as in Chiappori et al., 2022). Remarriage may be considered; in that case, the (expected) Pareto weights within the future (or contingent) union should be taken into account in the definition of each spouse's reservation utility.

A detailed analysis of these developments is outside the scope of the present model. The crucial aspect, however, is that they remain orthogonal to our main point, which relates to the type of variables that may affect spousal behavior at date t. That is, whatever one assumes on the nature and determinants of divorce, the dynamics of Pareto weights *during marriage* for each possible commitment mode remain as described by the previous equations. This generates restrictions on household behavior that we subsequently describe.

2.5 Nesting and restrictions on household behavior

To understand how the different commitment modes are related, it is useful to pool together the corresponding Pareto weights, namely

$$\begin{aligned} &\text{full commitment:} && \mu_{jt} = \mu_j(\Theta_0) \\ &\text{limited commitment:} && \mu_{jt} = \mu_j(W_t, Z_t, a_t, \mu_{jt-1}) \\ &\text{no commitment:} && \mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t), \end{aligned}$$

where we use $\mu_{jt} = \mu_{jt-1} + \nu_j(W_t, Z_t, a_t, \mu_{jt-1}) \equiv \mu_j(W_t, Z_t, a_t, \mu_{jt-1})$ in limited commitment. While there is some overlap in the sets of variables that enter each case, there seems to be no clear nesting across regimes.

The limited commitment Pareto weight depends on its past value, which summarizes the history of the household from marriage until today. If observed and accounted for, μ_{jt-1} is a sufficient statistic for the past (Kocherlakota, 1996). In practice, however, μ_{jt-1} is unobserved. From its law of motion, we can substitute the past weight recursively until $t = 0$ (marriage) to obtain $\mu_{jt} = \mu_j(W_t, Z_t, a_t,\ \mu_j(W_{t-1}, Z_{t-1}, a_{t-1},\ \mu_j(W_{t-2}, Z_{t-2}, a_{t-2}, \ldots,\ \mu_j(\Theta_0))))$. Unconditional on its past value, μ_{jt} thus depends on the entire information set since marriage, which includes all historical wages $W_{t-\tau}$, distribution factors $Z_{t-\tau}$, and assets $a_{t-\tau}$, $\tau \in \{1, \ldots, t-1\}$, that affected past participation constraints and, through them, the historical dynamics of bargaining power in the household. In other words, any variable that affects the unaccounted μ_{jt-1} must also affect the Pareto weight today. Consolidating the variables that enter the limited commitment weight and reordering the modes, we obtain

$$\begin{aligned}
&\text{full commitment:} && \mu_{jt} = \mu_j(\Theta_0) \\
&\text{no commitment:} && \mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t) \\
&\text{limited commitment:} && \mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t, \underbrace{W_{t-1}, Z_{t-1}, a_{t-1}, \underbrace{W_{t-2}, Z_{t-2}, a_{t-2}, \ldots}_{\text{enters through } \mu_{jt-2}}}_{\text{enters through } \mu_{jt-1}}),
\end{aligned}$$

which immediately reflects the nesting of the *sets of variables* (information sets) that matter for bargaining in each case.[19]

Contemporaneous information (e.g. information in W_t or Z_t) does not matter for the Pareto weight in full commitment but it does matter in no and limited commitment. Full commitment is thus nested (in terms of the variables that matter for bargaining) within both non-full commitment alternatives, which is a well-known result since Mazzocco (2007). This implies that if contemporary variables affect the Pareto weight, this effect serves as evidence against full commitment. In other words, current information is a natural exclusion restriction that can help separate full from non-full commitment.

Historical information (e.g. information in $W_{t-\tau}$ or $Z_{t-\tau}$, $\tau \geq 1$) does not matter for the Pareto weight in no (or full) commitment but it does matter in limited commitment. No commitment is thus nested within limited commitment, which is a new result in the literature.[20] This implies that if historical variables affect the contemporaneous Pareto weight, this effect serves as evidence against no commitment. In other words, history is a natural exclusion restriction that can help separate no from limited commitment.

The problem with this approach is that the Pareto weight is unobserved. From the

[19] Let $I_t = \{W_t, Z_t, a_t\}$. To be precise, we should write $\mu_{jt} = \widetilde{\mu}_j(\Theta_0, I_t, I_{t-1}, I_{t-2}, \ldots)$ in limited commitment, where $\widetilde{\mu}_j$ is the reduced form of $\mu_{jt} = \mu_j(I_t, \mu_j(I_{t-1}, \mu_j(I_{t-2}, \ldots,\ \mu_j(\Theta_0))))$. To avoid unnecessary notation (namely the tilde), we reinstate μ_j as the reduced form of its structural counterpart.

[20] Our predecessor paper (Chiappori et al., 2020) lays out exactly the same idea without, however, formally deriving the dynamics of the Pareto weight as we do here.

theory of dynamic programming, however, the optimal labor supply policies that solve (5) are functions of the state space $\Omega_t = \{X_t, W_t, a_t, \mu_{jt}\}$. Therefore, the previous exclusion restrictions on the Pareto weight immediately become exclusion restrictions on the (typically observed) individual labor supplies h_{1t} and h_{2t} in the household, given by

$$\begin{aligned}
&\text{full commitment:} && h_{jt} = h^*_{jt}(X_t, W_t, a_t, \mu_j(\Theta_0)) \\
&\text{no commitment:} && h_{jt} = h^*_{jt}(X_t, W_t, a_t, \mu_j(\Theta_0, W_t, Z_t, a_t)) \\
&\text{limited commitment:} && h_{jt} = h^*_{jt}(\underbrace{X_t, W_t, a_t}_{\text{non-bargaining state space}}, \mu_j(\underbrace{\Theta_0, W_t, Z_t, a_t, W_{t-1}, Z_{t-1}, a_{t-1}, \ldots}_{\text{bargaining state space}})),
\end{aligned}$$

for $j \in \{1, 2\}$. This clearly holds for all choices in the household; however, the assignability of labor supply allows us to exploit the properties of the so-called *sharing rule*.

The sharing rule (ρ_{1t}, ρ_{2t}) summarizes the share of total income each spouse can spend on private goods in a period and state of the world. In other words, it determines a person's private income in a period/state (Chiappori, 1992). Assuming leisure is a normal good, an increase in ρ_{jt} increases j's demand for leisure and decreases her supply of labor. Moreover, there is an one-to-one increasing relationship between j's Pareto weight μ_{jt} and share ρ_{jt}, therefore $\partial h_{jt}/\partial \mu_{jt} < 0$. This also implies $\partial h_{-jt}/\partial \mu_{jt} > 0$ as bargaining power is relative. In words, an improvement in j's bargaining position increases her leisure and reduces her labor supply; in parallel, her partner's bargaining position deteriorates, which reduces his leisure and increases his labor supply. This allows us to characterize how the various variables that enter the Pareto weight affect household labor supply.

Suppose we observe at least one initial bargaining variable $\theta_0 \in \Theta_0$ and at least one time-varying distribution factor $z_t \in Z_t$; suppose that theory or intuition suggest that both θ_0 and z_t empower j. Under *limited* commitment, we must jointly observe

$$\begin{aligned}
(\text{I}):&\quad \partial h_{jt}/\partial \theta_0 < 0 \quad &&\text{and} \quad \partial h_{-jt}/\partial \theta_0 > 0 \\
(\text{II}):&\quad \partial h_{jt}/\partial z_t < 0 \quad &&\text{and} \quad \partial h_{-jt}/\partial z_t > 0 \\
(\text{III}):&\quad \partial h_{jt}/\partial z_{t-\tau} < 0 \quad &&\text{and} \quad \partial h_{-jt}/\partial z_{t-\tau} > 0 \quad \text{for } \tau \geq 1,
\end{aligned}$$

because, as θ_0 and z_t empower j, they must decrease her labor supply and increase her partner's. This must be true also for past distribution factors in the third row because, as changes in bargaining power are persistent in limited commitment, any variable that affected bargaining power in the past will have a lasting effect on behavior in the future. Moreover, the recursive nature of the weight (and the fact that more recent shifts in distribution factors may undo previous shifts) implies that the effects of historical variables should diminish in magnitude the further back in time we go. We return to this point subsequently.

Full commitment implies that effects (II) and (III) are absent, while no commitment implies that (III) is absent. This is a consequence of the type of information that matters for the Pareto weight in each case. Effect (I) can only be observed cross-sectionally (the variables in Θ_0 do not vary over time) while effects (II) and (III), if present, can be observed cross-sectionally *and* longitudinally. Finally, effect (II) of current information is present in both no and limited commitment. Therefore, testing for current information alone, as in Mazzocco (2007)'s original idea, does not inform whether limited *or* lack of commitment is the right framework through which household behavior should be analyzed.

Two final remarks are in order. First, additional distribution factors increase the number of restrictions on household labor supply. Second, wages W_t are additional time-varying variables that enter the Pareto weight outside of full commitment. As is evident in the non-bargaining state variables in h^*_{jt}, of which W_t is part, wages are not conventional distribution factors because they also affect the budget set. However, *past* wages do not enter the state space outside of bargaining in limited commitment, so they satisfy the exclusion restriction of history. As they are also assignable, we should observe effect (III) in limited commitment also through past wages. Moreover, we show subsequently that the *partner*'s contemporaneous wage w_{-jt} does not enter the state space outside of bargaining in no/limited commitment, so it satisfies the exclusion restriction of contemporaneous information conditional on household income. The *partner*'s current wage thus serves as an additional distribution factor, inducing analogous effects to (II) in no and limited commitment. This role of wages is appealing because wages are readily available in household data while conventional distribution factors are harder to find. With these points in mind, we now turn to our test for commitment.

3 Test for commitment

Limited commitment describes an environment in which contemporaneous and historical distribution factors affect household behavior. Conditional on assets, history matters only through the past Pareto weight. No commitment is a special case of limited commitment in that history does not matter whereas current distribution factors still do, while full commitment is a special case of no commitment in that current distribution factors do not matter. One may thus test for commitment by testing whether contemporaneous and historical values of variables that enter the Pareto weight affect household behavior. Moreover, if behavior is assignable in the household, as in the case of labor supply, contemporaneous and historical information must affect it in a specific way determined by the assignability of the distribution factor and the behavioral variable itself. The crucial next step is to estimate the optimal policy functions h^*_{jt}, which are the objects over which we implement our test.

3.1 Alternative paths to estimating the policy functions

There are two main ways to estimate the labor functions h^*_{jt}.[21] The first approach involves the full or partial specification of preferences, expectations, and bargaining. This enables one to fully solve for and estimate the policy functions via methods of dynamic programming or to derive and estimate various optimality conditions. Examples are Mazzocco (2007) who specifies preferences and estimates the Euler equation, Voena (2015) who specifies the inside and outside values and solves for them numerically, or Lise and Yamada (2019) who specify preferences and the Pareto weight and estimate various marginal rates of substitution.

The alternative approach leaves preferences and expectations unspecified while it only specifies the reduced form dependence of the Pareto weight on its arguments. This still enables us to derive the problem's first order conditions and, through a Taylor expansion of marginal utility, estimate whether and how distribution factors (which enter the Pareto weight that appears in the optimality conditions) affect family labor supply. This approach is inspired by Blundell et al. (2016) who study how wage shocks transmit into labor supply and consumption in a unitary context.[22]

While the first approach enables the recovery of the specification and the assessment of counterfactual policies, its main drawback is that it requires the estimation of preferences together with bargaining. Therefore, any test for commitment is ultimately a *joint* test of commitment *and* the specification used for preferences. By contrast, the second approach does not require the specification of preferences – consequently, it is unable to recover deep parameters or evaluate counterfactuals. Given that our goal here is to test for commitment rather than recover preferences or bargaining primitives, it seems natural to follow the second path. This entails two main steps, the derivation of estimable labor supply equations from the model's first order conditions and the reduced form specification of the Pareto weight, both of which we describe subsequently.

3.2 Dynamics of household labor supply

We use the general form of the household problem in (5) to derive the static optimality conditions for male and female hours. These conditions depend on the tax/benefits function $\tau(y_t; \boldsymbol{\psi}_t)$ through the budget constraint. It is hard to make progress without restricting τ, so we follow Heathcote et al. (2014) and Blundell et al. (2016) and approximate τ as

$$y_t^D \equiv \tau(y_t; \boldsymbol{\psi}_t) \approx (1-\chi_t) y_t^{1-\kappa_t}.$$

[21]The distinction mimics the discussion of fully and partially specified models in Low and Meghir (2017).
[22]Theloudis (2017) extends this approach to a collective setting.

Tax/benefits parameters χ_t and κ_t reflect the proportionality and progressivity of the tax and benefits system as function of household characteristics $\boldsymbol{\psi}_t$. A progressive tax system has a strictly positive progressivity parameter κ_t while a proportional tax system has $\kappa_t = 0$. In that case, the spouses are taxed separately at the proportionality rate χ_t.[23]

Except a few special cases of utility, the optimality conditions are *implicit* functions of hours and cannot be directly estimated in the data. We follow Blundell et al. (2016) and carry out a standard log-linearization of $-u_{j[h]}$, the marginal utility of hours, around the most recent values of consumption and hours.[24] We show in online appendix B that this operation yields a closed-form expression for the growth rate of male and female hours in terms of changes in the Pareto weight and other variables, given by

$$\begin{aligned}\Delta \log h_{jt} = & \underbrace{\delta_j \boldsymbol{\pi}_j^{h\prime} h_{jt-1}^{-1} \Delta \boldsymbol{\xi}_{jt}}_{\text{1: taste effects}} + \underbrace{\delta_j h_{jt-1}^{-1} \Delta \log(1-\chi_t)}_{\text{2: tax effects}} - \underbrace{\delta_j \kappa_t s_{-jt-1} h_{jt-1}^{-1} \Delta \log y_{-jt}}_{\substack{\text{3: tax disincentives} \\ \text{from partner earnings}}} \\ & + \underbrace{\delta_j h_{jt-1}^{-1} \Delta \log \lambda_t}_{\substack{\text{4: wealth and} \\ \text{income effects}}} - \underbrace{\delta_j \zeta_j q_{t-1} h_{jt-1}^{-1} \Delta \log q_t}_{\substack{\text{5: consumption} \\ \text{complementarities}}} \\ & + \underbrace{\delta_j (1-\kappa_t s_{jt-1}) h_{jt-1}^{-1} \Delta \log w_{jt}}_{\text{6: substitution effects}} - \underbrace{\delta_j h_{jt-1}^{-1} \Delta \log \mu_{jt}}_{\text{7: bargaining effects}},\end{aligned} \tag{6}$$

where $j \in \{1,2\}$, $-j$ indicates j's partner, and Δ is the first difference between $t-1$ and t.[25] The first term reflects the response of hours to shifts in the taste observables $\boldsymbol{\xi}_{jt}$ that enter utility with a loading factor $\boldsymbol{\pi}_j^h$ (see appendix B). The second and third terms reflect the disincentives from shifts in, respectively, the proportionality of taxes and the partner's earnings due to progressive joint taxation. The fourth term reflects the wealth and income effects from shifts in the marginal utility of wealth λ_t (the Lagrange multiplier on the sequential budget constraint). The fifth term captures consumption-hours complementarities. The sixth term reflects the substitution effects on labor supply from shifts in own wage w_{jt}; the applicable wage rate accounts for progressive taxation. Finally, the seventh term reflects the bargaining effects on labor supply from shifts in the Pareto weight μ_{jt}.

Parameter δ_j is given by one over $\alpha_j^{-1} + \kappa_t s_{jt-1} h_{jt-1}^{-1}$, where $\alpha_j > 0$ is approximately equal to j's Frisch elasticity of labor supply scaled by his/her hours of work, and $s_{jt} \geq 0$

[23] Heathcote et al. (2014) estimate κ using PSID data over 1968-2007 and male earnings as the sole source of household income. They find $\kappa = 0.185$ with *st.err.* $= 0.001$. Blundell et al. (2016) study the performance of this approximation against the true underlying structure and find that it performs very well.

[24] Unlike Blundell et al. (2016), we do not log-linearize the intertemporal budget constraint.

[25] We assume the progressivity tax parameter does not change between proximate periods, so $\kappa_t = \kappa_{t-1}$. This assumption is innocuous (we show this in appendix B) and makes the notation more compact.

is j's share of family earnings. It follows that $\delta_j > 0$, which helps sign most of the terms above. For example, an increase in the proportionality of taxes reduces labor supply due to tax disincentives (term 2) while an improvement in j's Pareto weight reduces his/her hours reflecting the bargaining effects we described earlier (term 7). Finally, ζ_j reflects the nature of the consumption-hours complementarity and can thus be of any sign.[26]

Terms 1 through 6 appear also in the dynamic unitary model of Blundell et al. (2016) while term 7 is unique to the dynamic collective model. Expression (6) is common across commitment modes in the latter case, with differences in behavior across modes arising mostly through the last term, i.e. through the way the Pareto weight changes in each mode.[27] Then specifying an expression for the (reduced form) dependence of μ on its arguments, which we do in the next section, allows us to use (6) to test for commitment.

The *partner*'s current wage does not explicitly appear in (6) even though $w_{-jt} \in W_t$ was previously part of the non-bargaining state space of the problem. This is because, aside of bargaining, w_{-jt} induces tax disincentives and income effects that are fully accounted for by the partner's earnings and the marginal utility of wealth. Therefore, conditional on y_{-jt} and λ_t, w_{-jt} does not affect spouse j's hours outside of bargaining. This is in contrast to w_{jt} which is the price of time and thus affects hours irrespective of bargaining.

Two final remarks are due here. First, the nature of the log-linearization is such that the outcome equation is in terms of hours growth rather than of hours levels. While (6) is fully consistent with the policy function h^*_{jt}, it is nonetheless not the policy function itself which generally disciplines the levels of hours. Second, the Euler equation in our model is very complicated because wealth enters the Pareto weight outside of full commitment.[28] Our use of the static optimality condition avoids this complication at the cost of introducing a term for the marginal utility of wealth, $\Delta \log \lambda_t$. We return to this in section 4.3.

3.3 Dynamics of the Pareto weight

Our goal is to specify the reduced form dependence of the Pareto weight, specifically of $\Delta \log \mu_{jt}$, on its arguments, which will enable us to take (6) to the data.[29] To guide our choice of specification, consider the structural version of the most general Pareto weight, i.e. of limited commitment, given by $\mu_{jt} = \mu_j(W_t, Z_t, a_t, \mu_{jt-1})$ with $\mu_{j0} = \mu_j(\Theta_0)$, $j \in \{1, 2\}$. To simplify the discussion, let μ_{jt} be a function of one stochastic distribution factor $z_t \in Z_t$

[26] We show in appendix B that $\alpha_j = u_{j[h]}/(u_{j[hh]} \exp(-\boldsymbol{\pi}_j^{h\prime} \boldsymbol{\xi}_{jt-1}))$ and $\zeta_j = (u_{j[hq]} \exp(-\boldsymbol{\pi}_j^{q\prime} \boldsymbol{\xi}_{jt-1}))/u_{j[h]}$.

[27] Couples in limited commitment make savings choices taking into account the effects of those choices on the outside options. Therefore, the marginal utility of wealth λ behaves differently in limited commitment compared to the other modes but this is a feature we do not exploit for testing.

[28] Mazzocco (2007) uses a simpler Euler equation by assuming wealth does not affect the outside options.

[29] Notwithstanding the unobserved marginal utility of wealth λ, to which we return later.

and the past Pareto weight only, i.e. $\mu_{jt} = \mu_j(z_t, \mu_{jt-1})$, and let μ_{j0} be a function of one initial factor $\theta_0 \in \Theta_0$. Assume without loss of generality that both factors empower spouse j, i.e. $\partial\mu_{jt}/\partial z_t > 0$ and $\partial\mu_{j0}/\partial\theta_0 > 0$. We generalize the discussion to multiple distribution factors (as well as wages and assets) in online appendix C.

Suppose momentarily that $\ddot{\mu}_j(z_t, \mu_{jt-1})$ is the smooth approximation of $\mu_j(z_t, \mu_{jt-1})$. If the steps in μ are sufficiently small, $\ddot{\mu}$ will generally be a reasonable approximation of the true dynamics of the Pareto weight. We show in appendix C that a standard log-linearization of $\mu_{jt} \approx \ddot{\mu}_j(z_t, \mu_{jt-1})$ yields

$$\Delta \log \mu_{jt} \approx e_{\mu_j,z} \Delta \log z_t + e_{\mu_j,\mu_{jL}} \Delta \log \mu_{jt-1}, \tag{7}$$

where $e_{\mu_j,z}$ is the elasticity of the Pareto weight with respect to z and $e_{\mu_j,\mu_{jL}}$ is its elasticity with respect to the past weight (the subscript L denotes the lag). Economic theory disciplines the signs of these elasticities; in this case $e_{\mu_j,z} > 0$ due to the assignability of z while $e_{\mu_j,\mu_{jL}} > 0$ reflecting persistence in the Pareto weight in limited commitment. The elasticities depend on the past levels of the distribution factor due to the nature of the log-linearization (appendix C) and they thus vary in the cross-section. Expression (7) is useful because it relates the contemporaneous shifts in the Pareto weight to the contemporaneous shifts in the distribution factor and the most recent historical dynamics of the weight.

Exploring the recursive nature of (7), we can substitute the past Pareto weight backwards until we reach period $t = 0$, i.e. marriage, and $\Delta \log \mu_{j0}$ on the right hand side. $\Delta \log \mu_{j0}$ describes the formation of the initial Pareto weight at marriage, i.e. the difference between the initial weight μ_{j0} and a generic one available to all individuals when the first meet and start dating at $t = -1$.[30] The difference is driven by the initial distribution factor θ_0 and, as different couples differ in θ_0, $\Delta \log \mu_{j0}$ varies in the cross-section as a function of it. We adapt the simple log-linear formulation $\Delta \log \mu_{j0} = e_{\mu_j,\theta}\theta_0$, where $e_{\mu_j,\theta}$ reflects in reduced form the loading factor of θ_0 onto the initial weight. We expect $e_{\mu_j,\theta} > 0$ from the assignability of θ_0.

Combining these steps (exact derivation in online appendix C) yields

$$\Delta \log \mu_{jt} \;\approx\; \underbrace{\sum_{\tau=0}^{t-1} (e_{\mu_j,\mu_{jL}})^\tau e_{\mu_j,z} \Delta \log z_{t-\tau}}_{\substack{\text{cumulative growth in Pareto weight} \\ \text{due to time-varying distribution factors}}} \;+\; \underbrace{(e_{\mu_j,\mu_{jL}})^t e_{\mu_j,\theta}\theta_0}_{\substack{\text{formation of initial} \\ \text{Pareto weight} \\ \text{at marriage}}}, \tag{8}$$

[30]Let newly met individuals start dating with the same bargaining power. This is an innocuous normalization: the cardinality of the Pareto weight is irrelevant so we can always fix it in an arbitrary period. In a collective environment, the weight μ_{j0} of pairs that marry at $t = 0$ differs from the generic values at $t = -1$, with the difference determined by the distribution factor θ_0 realized at $t = 0$.

where t reflects the number of periods since marriage. (8) shows that the limited commitment Pareto weight at t is the accumulation of gradual shifts in the weight over time as a result of shifts in current ($\tau = 0$) and historical ($\tau = 1, \dots, t-1$) distribution factors z_τ, as well as θ_0 that reflects the formation of bargaining power at marriage. The effect of the distribution factor z on the current weight is given by $\partial \Delta \log \mu_{jt} / \partial \Delta \log z_{t-\tau} = (e_{\mu_j,\mu_{jL}})^\tau e_{\mu_j,z} > 0$. In appendix C, we show that $e_{\mu_j,\mu_{jL}} \leq 1$, so historical distribution factors have a gradually smaller effect as the length of time increases, with the rate of decay determined by $e_{\mu_j,\mu_{jL}}$.

Expression (8) encapsulates the alternative commitment modes and our nesting argument. Limited commitment has $e_{\mu_j,\mu_{jL}} > 0$, $e_{\mu_j,z} > 0$, $e_{\mu_j,\theta} > 0$, with the latter two signed by the assignability of z and θ_0. No commitment has $e_{\mu_j,\mu_{jL}} = 0$, $e_{\mu_j,z} > 0$, $e_{\mu_j,\theta} > 0$; as such no commitment is nested within limited commitment in terms of the variables that enter the Pareto weight. Full commitment has $e_{\mu_j,\mu_{jL}} = 0$, $e_{\mu_j,z} = 0$, $e_{\mu_j,\theta} > 0$; as such full commitment is nested within no commitment. Finally, the unitary model has $e_{\mu_j,\mu_{jL}} = 0$, $e_{\mu_j,z} = 0$, $e_{\mu_j,\theta} = 0$; as such the unitary model is nested within the full commitment collective model. Conditional on identifying $e_{\mu_j,\mu_{jL}}$, $e_{\mu_j,z}$, $e_{\mu_j,\theta}$, these points suggest the type of hypotheses one can formulate and assess in the data. We return to this in the next section.

Informed by (8), our choice of specification for the reduced form dependence of the Pareto weight on its arguments is

$$\Delta \log \mu_{jt} \approx \sum_{\tau=0}^{t-1} \eta^z_{j\tau} \Delta \log z_{t-\tau} + \eta^\theta_{jt} \theta_0. \tag{9}$$

The $\eta^z_{j\tau}$'s and η^θ_{jt} are reduced form elasticities for the response of j's Pareto weight to distribution factors: $\eta^z_{j\tau}$ captures the effect of the z factor τ periods in the past; η^θ_{jt} captures the effect of the θ initial factor t periods after marriage. With additional distribution factors (and wages and assets) affecting bargaining, the number of parameters increases considerably as we show in appendix C. Moreover, in our richest specification subsequently, we let the $\eta^z_{j\tau}$'s depend on the past levels of the distribution factors, that is $\eta^z_{j\tau} = \eta^z_{j\tau}(z_{t-\tau-1})$, to mimic the dependence of the elasticities $e_{\mu_j,z}$ and $e_{\mu_j,\mu_{jL}}$ on the past levels of the factors. A given shift in a distribution factor may thus shift the Pareto weight or not (that is, in spite of the smooth formulation in (9)), depending on the factors' historical values.

3.4 Formulation of test

Our final equation for male and female hours combines the dynamics of household labor supply in (6) with the Pareto weight in (9). After introducing additional distribution factors $z_{1t}, z_{2t} \in Z_t$ and $\theta_{10}, \theta_{20} \in \Theta_0$, reinstating wages $w_{1t}, w_{2t} \in W_t$ and assets a_t as arguments in the Pareto weight, and pooling common terms, the combined hours equation for spouse $j \in \{1,2\}$ is given by

$$
\begin{aligned}
\Delta \log h_{jt} \;=\; & \delta_j \boldsymbol{\pi}_j^{h\prime} h_{jt-1}^{-1} \Delta \boldsymbol{\xi}_{jt} \;+\; \delta_j h_{jt-1}^{-1} \Delta \log(1-\chi_t) \;-\; \delta_j \kappa_t s_{-jt-1} h_{jt-1}^{-1} \Delta \log y_{-jt} \\
& + \; \delta_j h_{jt-1}^{-1} \Delta \log \lambda_t \;-\; \delta_j \zeta_j q_{t-1} h_{jt-1}^{-1} \Delta \log q_t \\
& \underbrace{+ \; \delta_j (1-\kappa_t s_{jt-1} - \eta_{j0}^{w_j})}_{\substack{\beta_{j[w_{jt}]}\text{: substitution and bargaining effects} \\ \text{of own current wage}}} h_{jt-1}^{-1} \Delta \log w_{jt} \; \underbrace{- \; \delta_j \eta_{j0}^{w_{-j}}}_{\substack{\beta_{j[w_{-jt}]}\text{: bargaining effect} \\ \text{of partner's current wage}}} h_{jt-1}^{-1} \Delta \log w_{-jt} \\
& \underbrace{- \sum_{\tau=1}^{t-1} \delta_j \eta_{j\tau}^{w_j}}_{\substack{\beta_{j[w_{jt-\tau}]}\text{: bargaining effects} \\ \text{of own past wages}}} h_{jt-1}^{-1} \Delta \log w_{jt-\tau} \; \underbrace{- \sum_{\tau=1}^{t-1} \delta_j \eta_{j\tau}^{w_{-j}}}_{\substack{\beta_{j[w_{-jt-\tau}]}\text{: bargaining effects} \\ \text{of partner's past wages}}} h_{jt-1}^{-1} \Delta \log w_{-jt-\tau} \\
& \underbrace{- \sum_{\tau=0}^{t-1} \delta_j \eta_{j\tau}^{z_j}}_{\substack{\beta_{j[z_{jt-\tau}]}\text{: bargaining effects} \\ \text{of current and past } z_j}} h_{jt-1}^{-1} \Delta \log z_{jt-\tau} \; \underbrace{- \sum_{\tau=0}^{t-1} \delta_j \eta_{j\tau}^{z_{-j}}}_{\substack{\beta_{j[z_{-jt-\tau}]}\text{: bargaining effects} \\ \text{of current and past } z_{-j}}} h_{jt-1}^{-1} \Delta \log z_{-jt-\tau} \\
& \underbrace{- \sum_{\tau=0}^{t-1} \delta_j \eta_{j\tau}^{a}}_{\substack{\beta_{j[a_{t-\tau}]}\text{: bargaining effects} \\ \text{of current and past assets}}} h_{jt-1}^{-1} \Delta \log a_{t-\tau} \; \underbrace{- \; \delta_j \eta_{jt}^{\theta_j}}_{\substack{\beta_{j[\theta_{j0}]}\text{: bargaining} \\ \text{effect of } \theta_{j0}}} h_{jt-1}^{-1} \theta_{j0} \; \underbrace{- \; \delta_j \eta_{jt}^{\theta_{-j}}}_{\substack{\beta_{j[\theta_{-j0}]}\text{: bargaining} \\ \text{effect of } \theta_{-j0}}} h_{jt-1}^{-1} \theta_{-j0},
\end{aligned} \tag{10}
$$

where $-j$ indicates j's spouse. To simplify the discussion, we introduce the parameters β_j as the reduced form coefficients on wages and distribution factors that enter j's hours. We show in square brackets indexing β_j which variable each coefficient corresponds to; e.g., $\beta_{j[w_{-jt-\tau}]}$ is the coefficient on $\Delta \log w_{-jt-\tau}$, the partner's wage τ periods in the past.

Except one's own current wage, all other current and past wages and distribution factors enter the equation through the Pareto weight. We may thus formulate testable hypotheses on their coefficients in accordance with the alternative models. The own current wage w_{jt} enters (10) irrespective of bargaining (w_{jt} is the price of one's own hours), so $\beta_{j[w_{jt}]}$ cannot be part of these hypotheses.

Distribution factors do not affect behavior in the unitary model, which thus has

$$
\begin{aligned}
\mathcal{H}_0^{\text{Unit.}} : \; & \beta_{j[w_{-jt}]} = \beta_{j[w_{kt-\tau}]} = \beta_{j[z_{kt}]} = \beta_{j[z_{kt-\tau}]} = \beta_{j[\theta_{k0}]} = 0 \\
& \text{for } \tau \in \{1, \ldots, t-1\} \text{ and } k \in \{1,2\}.
\end{aligned}
$$

In words, the coefficients on the partner's current wage, all past wages, all current and past distribution factors, and the initial factors at marriage, are zero in the unitary model.

In the full commitment collective model, initial distribution factors affect behavior through the time $t = 0$ Pareto weight but later realizations of distribution factors do not. While this seems to suggest that $\beta_{j[\theta_{k0}]} \neq 0$, the coefficients on the initial factors be non-zero, this is *not* true in our formulation. Contrasting the reduced form specification of the Pareto weight in (9) with its structural counterpart in (8), it is clear that $\beta_{j[\theta_{k0}]} \equiv -\delta_j \eta_{jt}^{\theta_k} = -\delta_j (e_{\mu_j,\mu_{jL}})^t e_{\mu_j,\theta_k}$. Even if $e_{\mu_j,\theta_k} \neq 0$ and the initial factor structurally affects the initial weight, the past does not matter for behavior in full commitment, which has $e_{\mu_j,\mu_{jL}} = 0$ and therefore $\beta_{j[\theta_{k0}]} = 0$. In other words, any effect of the initial distribution factor θ_{k0} on the Pareto weight today is through the recursive structure and the persistence of the weight that are features of limited commitment alone. Consequently, full commitment has

$$\begin{aligned}\mathcal{H}_0^{\text{FC}}: \;& \beta_{j[w_{-jt}]} = \beta_{j[w_{kt-\tau}]} = \beta_{j[z_{kt}]} = \beta_{j[z_{kt-\tau}]} = \beta_{j[\theta_{k0}]} = 0 \\ & \text{for } \tau \in \{1, \dots, t-1\} \text{ and } k \in \{1, 2\},\end{aligned}$$

which is the same as $\mathcal{H}_0^{\text{Unit.}}$. This is because our dynamic differences framework revolves around the *growth* of the Pareto weight, $\Delta \log \mu_{jt}$, which is observationally equivalent between full commitment and the unitary model. The main implication is that if we *fail* to reject the common null, this failure cannot inform us about the true underlying structure.

Under no commitment, past distribution factors do not matter for behavior (this includes the initial factors at marriage for similar reasons as above) while current distribution factors do. No commitment thus has

$$\begin{aligned}\mathcal{H}_0^{\text{NC}}: \;& \beta_{j[w_{kt-\tau}]} = \beta_{j[z_{kt-\tau}]} = \beta_{j[\theta_{k0}]} = 0 \\ & \text{for } \tau \in \{1, \dots, t-1\} \text{ and } k \in \{1, 2\}.\end{aligned}$$

Moreover, the remaining β_j's must clearly be of the correct sign: $\beta_{j[w_{-jt}]} > 0$ (the partner's wage worsens j's bargaining power and increases j's hours) while $\beta_{j[z_{kt}]}$ is signed according to the assignability of z_k.[31]

Under limited commitment, finally, all current and past distribution factors matter for behavior, so all β_j's are different from zero. Limited commitment is the most general setting so it is without an alternative hypothesis or a conventional statistical test for it. Nevertheless, limited commitment remains testable in a conceptual sense. Clearly, all bargaining-related β_j's must be of the correct sign, disciplined by the assignability of the corresponding distri-

[31] The partner's wage w_{-jt} worsens j's bargaining power so $\eta_{j0}^{w_{-j}}$, the reduced form coefficient on w_{-jt} in equation (9), must be negative. Then $\beta_{j[w_{-jt}]} \equiv -\delta_j \eta_{j0}^{w_{-j}} > 0$ because $\delta_j > 0$ by construction.

bution factors. For example, $\beta_{j[w_{-jt}]} > 0$ (as in no commitment), $\beta_{j[w_{jt-\tau}]} < 0$ for $\tau \geq 1$ (own past wages improve past bargaining power and, through persistence in the Pareto weight, decrease own hours today), $\beta_{j[w_{-jt-\tau}]} > 0$ (for analogous reasons), and similarly for the many $\beta_{j[z_{kt-\tau}]}$'s and $\beta_{j[\theta_{k0}]}$'s according to the assignability of z_k and θ_k. Our test is therefore about the presence of effects from current and past wages and distribution factors, as well as, conceptually, about the sign of such effects.

The test offers many over-identifying restrictions. The obvious ones concern the *partner's* hours equation. For instance, to reject no commitment, we must reject $\mathcal{H}_0^{\text{NC}}$ as illustrated above but also the analogous hypothesis for the β_{-j}'s. If $\mathcal{H}_0^{\text{NC}}$ is rejected for $j \in \{1, 2\}$, in fact a joint test, limited commitment is a good alternative if $\beta_{j[w_{-jt}]} > 0$, $\beta_{j[w_{jt-\tau}]} < 0$, $\beta_{j[w_{-jt-\tau}]} > 0$, $\tau \geq 1$, etc., hold for *both* $j = 1$ *and* $j = 2$. Another set of restrictions stems from the presence of multiple distribution factors that give rise to proportionality restrictions as in Bourguignon et al. (2009). From the structural form of the Pareto weight in (8), it is easy to see that the ratio of partial effects of any two concurrent distribution factors is independent of when the factors are timed, e.g. $(\partial\Delta \log \mu_{jt}/\partial\Delta \log w_{1t-\tau})/(\partial\Delta \log \mu_{jt}/\partial\Delta \log w_{2t-\tau}) = e_{\mu_j,w_1}/e_{\mu_j,w_2}$ independent of τ. This translates into proportionality restrictions on the bargaining effects on hours, that is $\beta_{j[w_{1t-\tau}]}/\beta_{j[w_{2t-\tau}]} = \eta_{j\tau}^{w_1}/\eta_{j\tau}^{w_2}$ is the same for all $\tau \geq 1$.[32]

Two final remarks are due here. First, the hypotheses do not involve assets even if assets enter the Pareto weight outside of full commitment. Unlike wages or z_k and θ_k, wealth is non-assignable so it is not clear whom it empowers. Second, although $\beta_{j[w_{jt}]}$ is not useful for testing because the own current wage affects hours irrespective of bargaining, it turns out that we can identify $\eta_{j0}^{w_j}$, the Pareto weight coefficient on w_{jt}. This parameter must be positive in no and limited commitment, which offers an additional testable restriction. We return to this point in section 4.3.

4 Empirical implementation

4.1 Data requirements

Our test requires panel data over at least three periods. Two periods are needed to form the concurrent growth of hours and distribution factors, thus test whether contemporaneous factors affect behavior; this essentially tests for full commitment as in Mazzocco (2007). A third period is needed to form the immediately past growth of distribution factors, thus

[32]The proportionality restrictions extend beyond this illustration. For example, the ratio of partial effects of a given distribution factor ι periods apart is also constant and independent of when the effects are exactly timed, i.e. $(\partial\Delta \log \mu_{jt}/\partial\Delta \log w_{1t-\tau})/(\partial\Delta \log \mu_{jt}/\partial\Delta \log w_{1t-\tau-\iota}) = e_{\mu_j,\mu_{jL}}^{-\iota}$ for all $\tau \geq 1$.

test whether history affects behavior; this in turn separates no and limited commitment. Additional periods strengthen the test with over-identifying restrictions on the role of history.

The test requires at least one time-varying and one initial distribution factor assignable in the couple in order to assess all parts of $\mathcal{H}_0^{\text{FC}}$ and $\mathcal{H}_0^{\text{NC}}$. Assignability enables us to test the signs of the coefficients. The partner's wage w_{-jt} is the obvious assignable time-varying factor so additional $z_{jt} \in Z_t$ are not strictly needed. The availability of multiple factors, however, strengthens the test with additional restrictions.

Given the requirement to have data on the household over a minimum of three periods, it follows that the couple must stay intact (i.e. not divorce) over this course of time. Empirically, this implies that a household should not divorce in the three periods since it is first observed. A couple may divorce later but information from those periods is not part of our test since (10) describes behavior for as long as the couple remains married.

4.2 Sample selection

We use public data from the Panel Study of Income Dynamics in the US. The PSID started in 1968 as an income and employment survey of a representative sample of households and their split-offs. It was later redesigned to enable the collection also of expenditure and wealth information. As our estimating equation includes consumption and wealth controls, we focus on the period between 1999-2019 when this information is available.[33]

We focus on the core Survey Research Center (initially representative) sample and we select married households in which the spouses are between 21 and 65 years old. Consistent with our data requirements, we keep couples observed for at least three consecutive periods. We require complete data on earnings, hours, wages, consumption, wealth, and demographics. Given our outcome variable, we restrict the sample to couples in which both partners participate in the labor market.[34] We return to this last selection in section 6.

Appendix table E.1 summarizes our baseline sample of 13,955 observations that meet these criteria. The sample conforms to expectations regarding income, labor supply, and demographics among married couples in the PSID (e.g. Blundell et al., 2016). For example, women work on average for 1,758 hours/year and earn \$47,843, which is about 79% of men's average hours (2,231 hours/year) but only 59% of men's earnings (\$81,742) respectively. We use this sample to test for commitment; when we deviate from it, we explicitly describe how we do.

[33]Detailed information on the PSID and access to the data are available at psidonline.isr.umich.edu. The PSID is biennial over 1999-2019; we let $\Delta x_t = x_t - x_{t-1}$ denote the first difference in x between 'current' and 'previous' period, even though the 'previous' period refers to two calendar years in the past.

[34]Among couples who meet all other selection criteria, 91.6% of men and 80.1% of women work for pay.

4.3 Estimation details and econometric issues

Modeling choices. We must address three final issues before we run the test. The first concerns the marginal utility of wealth. $\Delta \log \lambda_t$ reflects the change from $t-1$ to t in the couple's marginal utility over total income and wealth. The couple adjusts wealth endogenously in expectation of future states of the world; this reflects precautionary savings and, in limited commitment, investment in the outside options.[35] As $\Delta \log \lambda_t$ is unobserved, we replace it with a function of the growth in household income $\Delta \log y_t$ and wealth $\Delta \log a_t$, namely $\Delta \log \lambda_t = \ell_{\Delta y} \Delta \log y_t + \ell_{\Delta a} \Delta \log a_t + \ell_y \log y_{t-1} + \ell_a \log a_{t-1}$. Since $\Delta \log \lambda_t$ may depend on the initial values of income and wealth, we also included terms for those. We tried richer polynomials and additional lags and our results were not sensitive.

The second issue concerns the hourly wage. Wages have a lifecycle component that agents typically anticipate and which is unlikely to induce bargaining between the spouses. We specify the growth rate of wages as the sum of a deterministic component, anticipated at $t=0$, and a stochastic component; we write $\Delta \log w_{jt} = \boldsymbol{\pi}_j^{w\prime} \mathbf{x}_{jt}^w + \omega_{jt}$, where $\mathbf{x}_{jt}^w$ is a vector of demographics (e.g. age, education) that enter the deterministic part and ω_{jt} is the wage shock such that $\mathbb{E}_t(\omega_{jt} | \mathbf{x}_{jt}^w) = 0$ (ω_{jt} should not be confused with the bold case $\boldsymbol{\omega}_t$ that we use to describe a realization of the state space).[36] We assume that the wage shock is the only part that induces bargaining between the spouses, that is, the only component of wages that shifts the Pareto weight under no and limited commitment.[37]

The third issue concerns our choice of distribution factors in Z_t and Θ_0. For the first set, we seek assignable factors that vary over time. Voena (2015) explores changes in divorce and property division laws; but these changes occur mostly in the 1970s and 1980s, which is outside our time frame.[38] Chiappori et al. (2012) and Dupuy and Galichon (2014) use anthropometric measures to determine a person's attractiveness. We take up on this and employ the spouses' body mass index as distribution factor, i.e. $Z_t = \{BMI_{1t}, BMI_{2t}\}$. The underlying premise is that one's body mass influences their attractiveness in the marriage market, thus affecting their bargaining power at home.

For the second set, we seek assignable factors that are set at $t=0$ and remain constant

[35] Savings also serve the purpose of funding retirement or leaving bequests (e.g. De Nardi, 2004). We abstract from these features for simplicity of the model/illustration.

[36] It is typical in the income dynamics literature to specify log wages/incomes as the sum of a deterministic and a stochastic component, e.g. Altonji et al. (2013), Blundell et al. (2016). See Meghir and Pistaferri (2011) for a recent review.

[37] Nevertheless, the deterministic profile of own wages affects the gradient of hours through the own wage term 6 in equation (6). We show this point in detail in online appendix D.

[38] See also Stevenson (2007). Chiappori et al. (2002) use variation in marital sex ratios across states, which are unlikely to vary much over time. Blau and Goodstein (2016) use the receipt of inheritance as distribution factor; this is assignable and time-varying but we do not observe inheritances in the PSID.

thereafter; but we rarely observe the time of marriage in the PSID, which limits our options. We use two age-gap-at-marriage variables, namely $\Theta_0 = \{\mathbb{1}[age_1 << age_2], \mathbb{1}[age_1 >> age_2]\}$. The first dummy indicates the husband is younger than the wife while the second indicates he is much older.[39] The underlying premise in both cases is that youth empowers oneself as the youngest person's marriage market is typically more active.

For both Z_t and Θ_0, our choices are subject to limitations; we discuss those together with the results in section 5. Recall, however, that $z_{jt} \in Z_t$ are not strictly needed for our test (wages *are* time-varying distribution factors) so we present results with and without Z_t.

Specifications and heterogeneity. After implementing these modeling choices within (10) and consolidating common terms, the final equation for hours of spouse $j \in \{1, 2\}$ is given in compact form by

$$\begin{aligned}\Delta \log h_{jt} = \Big\{ & b_{j[0]} + \mathbf{b}'_{j[\Delta\xi_{jt}]} \Delta\boldsymbol{\xi}_{jt} + \mathbf{b}'_{j[x^w_{jt}]} \mathbf{x}^w_{jt} \\ & + \beta_{j[w_{jt}]}\omega_{jt} + \beta_{j[w_{-jt}]}\omega_{-jt} + \sum_{\tau=1}^{t-1} \beta_{j[w_{jt-\tau}]}\omega_{jt-\tau} + \sum_{\tau=1}^{t-1} \beta_{j[w_{-jt-\tau}]}\omega_{-jt-\tau} \\ & + \sum_{\tau=0}^{t-1} \beta_{j[bmi_{jt-\tau}]} \Delta \log BMI_{jt-\tau} + \sum_{\tau=0}^{t-1} \beta_{j[bmi_{-jt-\tau}]} \Delta \log BMI_{-jt-\tau} \\ & + \beta_{j[young_j]} \mathbb{1}[age_j << age_{-j}] + \beta_{j[young_{-j}]} \mathbb{1}[age_j >> age_{-j}] \\ & + b_{j[\Delta y_t]} \Delta \log y_t + b_{j[\Delta a_t]} \Delta \log a_t + b_{j[y_{t-1}]} \log y_{t-1} + b_{j[a_{t-1}]} \log a_{t-1} \\ & + b_{j[\Delta y_{-jt}]} s_{-jt-1} \Delta \log y_{-jt} + b_{j[\Delta q_t]} q_{t-1} \Delta \log q_t + \sum_{\tau=1}^{t-1} \beta_{j[\Delta a_{t-\tau}]} \Delta \log a_{t-\tau} \Big\} \times h^{-1}_{jt-1}.\end{aligned} \tag{11}$$

We derive this equation in appendix D; we discuss measurement error in appendix F.

We estimate three gradually richer specifications. The *first* is the reduced form linear regression of $\Delta \log h_{jt}$ on the right hand side variables in (11), assuming the coefficients are constant in the cross-section. Estimation, e.g. via OLS, delivers estimates of the reduced form bargaining effects of wages and distribution factors, enabling testing of the commitment hypotheses. This simplest form of our test affirms that the test is easy to implement in reduced form without imposing or estimating preferences.

The pure reduced form neglects the dependence of the coefficients on hours and earnings through $\delta_j = 1/(\alpha_j^{-1} + \kappa_t s_{jt-1} h^{-1}_{jt-1})$. Our *second* specification estimates (11) respecting the underlying structure of the coefficients. We fix the tax progressivity parameter $\kappa_t = 0.185$

[39] We consider the husband older if he is at least 4 years older than the wife.

(Blundell et al., 2016) and identify δ_j through $b_{j[y_{-jt}]}$; see appendix D for details. This enables us to estimate α_j (a scaled Frisch labor supply elasticity) and all bargaining parameters η_j, including $\eta_{j0}^{w_j}$ that describes how the Pareto weight shifts with own current wage w_{jt}.

We also attempt to replace the η_j's with their structural counterparts, namely the elasticities e from the log-linearized version of the limited commitment weight in (8). This is equivalent to imposing proportionality restrictions across distribution factors and over time. It enables us to estimate the elasticities of the Pareto weight with respect to wages and distribution factors, but also $e_{\mu_j,\mu_{jL}}$, the elasticity with respect to its past value.

The elasticities of the Pareto weight depend on the immediate past levels of the distribution factors (section 3.3). We reflect this in our *third* specification by letting the η_j's depend on the immediate past levels of all distribution factors.[40] A distribution factor may thus not induce uniform bargaining effects for given hours and earnings; instead, it may shift the Pareto weight or not, depending on the factors' historical values.

There is no reason to believe that all couples feature the same degree of commitment: in reality, some couples may commit fully while others may not. In principle, we could test for commitment on a household-by-household basis, allowing each household a household-specific degree of commitment, a household-specific η_j. While this is theoretically appealing, estimation of (11) household-by-household requires long time series, which we clearly lack. We thus pool households together and estimate a form of aggregate bargaining effects across households. In spite of this, our third specification allows those effects to vary with the underlying levels of wages and distribution factors. This introduces vast amounts of heterogeneity in bargaining effects across households, as we illustrate subsequently.

We estimate all three specifications initially in the baseline sample of households that we observe for at least three consecutive periods. Subsequently, we estimate them again over a smaller sample of households observed for at least four consecutive periods. This strengthens our test with additional restrictions on the role of history. We do not go beyond four periods because we run into small samples. In all cases, we first admit wages as the sole time-varying distribution factor; then we introduce BMI.

[40] For example, we specify the coefficients η_{j0} on current (time t) wages as:

$$\begin{aligned}\eta_{j0}^{w_j} &= \eta_{j0}^{w_j\{0\}} + \eta_{j0}^{w_j\{1\}} w_{jt-1} + \eta_{j0}^{w_j\{2\}} w_{-jt-1} + \eta_{j0}^{w_j\{3\}} BMI_{jt-1} + \eta_{j0}^{w_j\{4\}} BMI_{-jt-1} \\ \eta_{j0}^{w_{-j}} &= \eta_{j0}^{w_{-j}\{0\}} + \eta_{j0}^{w_{-j}\{1\}} w_{jt-1} + \eta_{j0}^{w_{-j}\{2\}} w_{-jt-1} + \eta_{j0}^{w_{-j}\{3\}} BMI_{jt-1} + \eta_{j0}^{w_{-j}\{4\}} BMI_{-jt-1}\end{aligned}$$

We do similarly for η_{j1} (a function of time $t-2$ wages and BMI) and η_{j2} (a function of time $t-3$ wages and BMI). We also tried richer specifications that include the age-gap-at-marriage (our preferred specification) and dummies for whether and how long the couple has been in their first marriage and whether the spouses share similar education and race. It is reasonable to believe that the extent of commitment, so the bargaining effects of distribution factors, depends also on marital demographics, whose effect manifests through the dependence of $e_{\mu_j,\mu_{jL}}$ on the past Pareto weight and, therefore, recursively on Θ_0 (appendix C).

Empirical strategy. Unlike the first specification, estimation in the second and third cases requires GMM because of the non-linear structure of δ_j. GMM estimation of the full underlying structure of (11) is very slow due to the dimensionality of demographics $\Delta\boldsymbol{\xi}_{jt}$ and $\mathbf{x}^w_{jt}$. To avoid this, we run a first stage regression to net $\Delta \log h_{jt}$ of the demographics. We then estimate the remaining terms in a second stage using residual hours on the left hand side. This two-step estimation is similar to Blundell et al. (2016); a single step delivers similar point estimates, albeit much more slowly.

Our empirical strategy proceeds as follows. First, we regress wage growth $\Delta \log w_{jt}$ on observables to obtain the wage shock ω_{jt}. Second, we regress hours growth $\Delta \log h_{jt}$ on inverse past hours and taste/wage observables (times inverse past hours) to obtain residual hours consistent with the first line in (11).[41] Third, we regress residual hours on all other variables in (11), which allows us to estimate the various bargaining effects. Whenever there are over-identifying restrictions, we use multiple moments and a diagonal weighting matrix.

5 Results

5.1 Wages as sole time-varying distribution factor

Reduced form specification. The first results concern the bargaining effects of wages from the reduced form (first) specification of the commitment test. This is the simplest form of our test, one that can quickly inform about commitment in a sample of observations. For brevity, we only report the main effects in table 1; the full results including the terms that we do not explicitly show here appear in appendix table E.2.

Columns 1 & 2 show the wage terms in the male and female hours equations in the baseline sample of households observed for at least three consecutive periods.[42] Three points emerge. First, the shock to the partner's wage at t enters significantly positively in the male equation, and it is small, negative, and insignificant in the female equation ($\beta_{j[w_{-jt}]}$).[43] This term should be zero in full commitment but positive in the other regimes. Under no and limited commitment, an increase in the partner's wage empowers the partner, thus worsens one's own relative bargaining position and increases one's own labor supply.[44] The significant

[41] The first stage observables for wages and hours include dummies for year, year of birth, education, race, region, number of family members (and its change over time), number of children (and its change over time), the presence of income recipients other than the main couple (present and past), and the presence of outside dependents (present and past). We also include education-year, race-year, and region-year interactions.

[42] The number of observations is smaller than 13,955 as the estimating equations are in first difference.

[43] The shock to *own* wage at t enters negatively in both equations ($\beta_{j[w_{jt}]}$). This measures an aggregate of substitution and bargaining effects of own wages so $\beta_{j[w_{jt}]}$ is not used as part of the commitment test.

[44] Recall that we control for family income, wealth, and partner earnings, so the partner's wage effect cannot be interpreted as an income, wealth, or joint taxation effect.

positive effect on the male side is thus indicative of non-full commitment.

Second, the shocks to wages at $t-1$, both to own and partner wages, enter both equations mostly significantly and with the sign predicted by limited commitment. Under full or no commitment past events do not matter for current behavior so $\beta_{j[w_{jt-1}]}$ and $\beta_{j[w_{-jt-1}]}$ should be zero.[45] By contrast, history matters in limited commitment and past events that shift past bargaining power have lasting effects on behavior in a specific way. This is precisely what we see here: own past shocks reduce own labor supply while the partner's shocks increase it. This is consistent with power shifts under limited commitment, in which favorable shocks improve the bargaining power of the spouse that receives them and, through persistence in the Pareto weight, reduce own future labor supply and increase the partner's.[46]

Third, the initial distribution factors enter both equations significantly and mostly with the sign limited commitment postulates. The dummy for being the younger spouse consistently enters negatively ($\beta_{j[young_j]}$) while the dummy for being the older spouse enters positively among women, the expected sign under limited commitment, but negatively among men ($\beta_{j[young_{-j}]}$). We introduced these age-gap-at-marriage dummies to reflect the idea that youth empowers oneself through a relatively more active marriage market. Yet, it is unclear if these variables are distribution factors in the true sense or if they also affect tastes. But it is hard to explain from a tastes argument alone why being the youngest reduces hours (the young typically work more), thus explain why $\beta_{j[young_j]} < 0$ as we find here.

Columns 3 & 4 show the wage terms in the smaller sample of households observed for at least four consecutive periods. The extra period allows us to introduce the wage shocks at $t-2$ and test additional restrictions on the role of history. While significance in a statistical sense is reduced (we are estimating a more flexible equation over a smaller sample), the effects of wage shocks at t and $t-1$ and the effects of the initial factors remain qualitatively unchanged from the baseline. In addition, the shocks at $t-2$ enter both equations consistent with limited commitment. The husband's older shocks reduce his hours and increase the wife's while, symmetrically, the wife's older shocks reduce her hours and raise the husband's. These effects, which are consistent with power shifts under limited commitment as in the case of the $t-1$ shocks above, should be absent in either full or no commitment.[47]

Regardless of the length of history, we reject full commitment (therefore also the unitary

[45]This is true only conditional on the realization of the state space today. This conditioning takes place in our setting through our income, wealth, and other controls, consistent with the model of section 2.

[46]Recall that we control for family income and wealth, so we account for income and wealth effects that past wage shocks induce on future behavior. Such effects would anyway operate with the same sign across male and female hours, while the coefficient $\beta_{j[w_{kt-1}]}$ clearly flips its sign over j.

[47]The wage shocks may be correlated over time or across spouses. This does not jeopardize our test as we explicitly include as regressors the male and female shocks over multiple periods.

Table 1: Commitment test – summary of reduced form results

Dependent variable: $\Delta \log h_{jt}$	FC	NC	LC	≥ 3 periods (current & past shocks) (1) Male $j=1$	(2) Female $j=2$	≥ 4 periods (current, past, & older shocks) (3) Male $j=1$	(4) Female $j=2$
Current shocks (t)							
$\beta_{j[w_{jt}]}$	.	.	.	-30.678	-10.277	-34.754	-16.000
				(10.658)	(3.517)	(19.947)	(12.844)
$\beta_{j[w_{-jt}]}$	0	+	+	52.833	-2.553	39.378	-11.346
				(26.151)	(6.244)	(30.974)	(18.726)
Past shocks $(t-1)$							
$\beta_{j[w_{jt-1}]}$	0	0	−	-13.855	-7.338	-11.014	-5.027
				(5.283)	(3.442)	(10.113)	(10.308)
$\beta_{j[w_{-jt-1}]}$	0	0	+	41.039	6.017	29.492	-6.920
				(20.351)	(7.115)	(34.603)	(17.087)
Older shocks $(t-2)$							
$\beta_{j[w_{jt-2}]}$	0	0	−			-32.734	-9.642
						(16.698)	(6.756)
$\beta_{j[w_{-jt-2}]}$	0	0	+			2.413	24.651
						(28.807)	(15.101)
Initial distribution factors $(t=0)$							
$\beta_{j[young_j]}$	0	0	−	-27.979	-14.682	-96.849	-47.777
				(26.594)	(6.370)	(33.144)	(11.887)
$\beta_{j[young_{-j}]}$	0	0	+	-80.532	10.376	-128.443	20.781
				(30.226)	(4.579)	(40.309)	(10.502)
p value for $\mathcal{H}_0^{\text{FC}}$				0.000	0.000	0.001	0.000
p value for $\mathcal{H}_0^{\text{NC}}$				0.001	0.000	0.001	0.000
Observations				8,513		6,028	

Notes: The table reports the coefficients on wages from the reduced form (first) specification of the commitment test. The full results including the terms of the test that we do not explicitly show here appear in online appendix table E.2. Standard errors clustered at the household level are in brackets.

model) and no commitment at least at the 0.1% significance level in all cases.[48]

A final point is due here. The large coefficients of table 1 are the result of h_{jt-1}^{-1} multiplying the right hand side of (11). We can thus not interpret the coefficients as the elasticities of hours with respect to wage shocks. It is straightforward to calculate the partial effects of wages but, in the interest of brevity, we only do this in our richest specification below.

[48]In principle, we should test the null hypotheses *jointly* across male and female equations. For simplicity, we estimate these equations separately (there are no cross-equation restrictions) so we also conduct testing separately. This shortcut does not affect the outcome of our test.

Structural specification. The second set of results reflects the underlying structure of the coefficients in (11), which the reduced form results neglect. Accounting for the underlying structure has several advantages. It allows us to estimate α_j (a scaled Frisch elasticity of labor supply) and benchmark it against the broader literature, and $\eta_{j0}^{w_j}$, the Pareto weight coefficient on *own current* wage. It also accounts for the dependence of the coefficients on earnings and hours, thus relaxing the restriction of homogeneity of effects across households.[49] We report the main parameters in table 2; the full results including the terms that we do not explicitly show there appear in appendix table E.3.

Results across columns 1 & 2 (baseline, three periods) and 3 & 4 (four periods) paint a similar picture. We report four main points. First, the own current wage shock improves one's Pareto weight ($\eta_{j0}^{w_j} > 0$) while the partner's current shock worsens it ($\eta_{j0}^{w_{-j}} < 0$). This contradicts full commitment but it is consistent with the other two modes. Second, own past shocks from $t-1$ and $t-2$ empower oneself ($\eta_{j1}^{w_j} > 0$, $\eta_{j2}^{w_j} > 0$), while the partner's past shocks either weaken oneself or leave him/her untouched ($\eta_{j1}^{w_{-j}} \leq 0$, $\eta_{j2}^{w_{-j}} \leq 0$). Under full or no commitment, past shocks should not affect current bargaining power. Statistical significance is generally low but any parameter that *is* significant has the sign that limited commitment requires. Third, being the younger spouse consistently empowers oneself ($\eta_{jt}^{young_j} > 0$) while being the older spouse produces mixed results as in the reduced form previously. Fourth, $\alpha_j/\mathbb{E}(h_{jt-1})$ is approximately equal to the Frisch elasticity of labor supply evaluated at average hours; we estimate it at 0.55-1.02 for men and 0.33-0.72 for women, generally in line with the literature (e.g. Keane, 2011; Attanasio et al., 2018; Wu and Krueger, 2021).[50] In all cases, we again reject full and no commitment at conventional significance levels.[51]

The disproportionately large Pareto weight elasticity with respect to own vs the partner's *current* wage ($\eta_{j0}^{w_j}$ vs $\eta_{j0}^{w_{-j}}$), in contrast to the similar magnitudes of the analogous elasticities with respect to *past* wages, questions the proportionality properties of distribution factors (but see discussion of measurement error in appendix F). To assess this, we impose proportionality in the Pareto weight elasticities, which also enables us to estimate the elasticity of μ_j with respect to its past value.[52] The results in table E.4 are in line with the earlier results without providing a worse overall fit. We strongly reject full and no commitment.

[49] The coefficients in (11) are functions of $\delta_j = 1/(\alpha_j^{-1} + \kappa_t s_{jt-1} h_{jt-1}^{-1})$, so they depend on the underlying past earnings shares s_{jt-1} and hours h_{jt-1}. Online appendix D provides clarity on this point.

[50] α_j/h_{jt-1} is *exactly* equal to the Frisch labor supply elasticity if preferences are separable between leisure and consumption. Otherwise, the Frisch elasticity is a function of α_j/h_{jt-1} and the extent of non-separability; see Blundell et al. (2016) appendix 1 for details. The larger male elasticity, while not uncommon, e.g. Wu and Krueger (2021), may partly reflect a different degree of consumption-leisure complementarity.

[51] It is straightforward to recast the commitment hypotheses in terms of the Pareto weight elasticities η_j.

[52] We re-estimate the model subject to $\eta_{j\tau}^{w_k} = (e_{\mu_j,\mu_{jL}})^\tau e_{\mu_j,w_k}$, for $j,k \in \{1,2\}$ and $\tau \in \{0,1,2\}$, as per the log-linearized Pareto weight in (8). The alternative approach is to test the proportionality restrictions directly on the parameter estimates of table 2. However, this does permit estimation of $e_{\mu_j,\mu_{jL}}$.

Table 2: Commitment test – summary of structural results

Dependent variable: $\Delta \log h_{jt}$	FC	NC	LC	≥ 3 periods (current & past shocks) (1) Male $j=1$	(2) Female $j=2$	≥ 4 periods (current, past, & older shocks) (3) Male $j=1$	(4) Female $j=2$
Pareto weight elasticities w.r.t current shocks ($\tau=0$)							
$\eta_{j0}^{w_j}$	0	+	+	1.020	1.007	1.004	1.006
				(0.010)	(0.010)	(0.011)	(0.012)
$\eta_{j0}^{w_{-j}}$	0	−	−	−0.034	−0.003	−0.025	−0.006
				(0.022)	(0.012)	(0.017)	(0.018)
Pareto weight elasticities w.r.t shocks 1 period in the past ($\tau=1$)							
$\eta_{j1}^{w_j}$	0	0	+	0.012	0.009	0.010	0.002
				(0.006)	(0.008)	(0.006)	(0.010)
$\eta_{j1}^{w_{-j}}$	0	0	−	−0.032	0.000	−0.031	0.002
				(0.022)	(0.019)	(0.020)	(0.015)
Pareto weight elasticities w.r.t shocks 2 periods in the past ($\tau=2$)							
$\eta_{j2}^{w_j}$	0	0	+			0.010	0.009
						(0.012)	(0.005)
$\eta_{j2}^{w_{-j}}$	0	0	−			−0.023	−0.026
						(0.018)	(0.016)
Pareto weight elasticities w.r.t initial distribution factors							
$\eta_{jt}^{young_j}$	0	0	+	0.046	0.025	0.062	0.038
				(0.024)	(0.011)	(0.024)	(0.014)
$\eta_{jt}^{young_{-j}}$	0	0	−	0.096	−0.023	0.077	−0.021
				(0.035)	(0.010)	(0.037)	(0.009)
Frisch elasticity α_j/h_{jt-1} #				0.545	0.330	1.017	0.720
				(0.164)	(0.136)	(0.347)	(0.263)
p value for $\mathcal{H}_0^{\text{FC}}$				0.000	0.000	0.000	0.000
p value for $\mathcal{H}_0^{\text{NC}}$				0.025	0.032	0.052	0.050
Observations				8,513		6,028	

Notes: The table reports the Pareto weight elasticities with respect to wages from the structural (second) specification of the commitment test. The full results including the terms that we do not explicitly show here appear in online appendix table E.3. Standard errors clustered at the household level are in brackets. #We report the Frisch elasticity at average hours (the standard error calculated with the delta method).

We estimate $e_{\mu_j,\mu_{jL}}$ at about 0.015 (statistically significant at this value), revealing a positive but weak association between current and past Pareto weight.

Heterogeneity. The third set of results allows for heterogeneity in the Pareto weight elasticities η_j through their dependence on the past levels of distribution factors. Along with the dependence of δ_j on earnings and hours, this specification introduces vast amounts of cross-household heterogeneity in the bargaining effects of wages. As each household has its own bundle of earnings, hours, wages, we use the parameters to calculate household-specific partial effects of wage shocks, namely $\partial\Delta\log h_{jt}/\partial\omega_{kt-\tau}$ for $j,k \in \{1,2\}$ and $\tau \in \{0,1,2\}$. We plot in figure 1 the partial effects for all households in the sample; the left graphs show the effects of own shocks (each row corresponds to shocks from a different period) while those on the right show the effects of partner shocks. We summarize key moments in table 3 and we report the parameter estimates in appendix table E.5.[53]

The average partial effects of older shocks (shocks from period $t-2$ in panel 1c) are $\mathbb{E}(\partial\Delta\log h_{jt}/\partial\omega_{jt-2}) < 0$ and $\mathbb{E}(\partial\Delta\log h_{jt}/\partial\omega_{-jt-2}) > 0$. Away from the average, most households exhibit negative or zero labor supply effects from own shocks (so favorable *own* shocks empower oneself) and positive or zero effects from partner shocks (so favorable *partner* shocks weaken oneself). These effects are consistent with power shifts in limited commitment, in which good past shocks improved the bargaining power of the spouse that received them and, through persistence in the Pareto weight, shift future labor supply. It is remarkable that the effects survive 4 calendar years (the time that lapses from $t-2$ to t in the PSID), the controls for all subsequent wage shocks, and the multiple wealth and income controls.

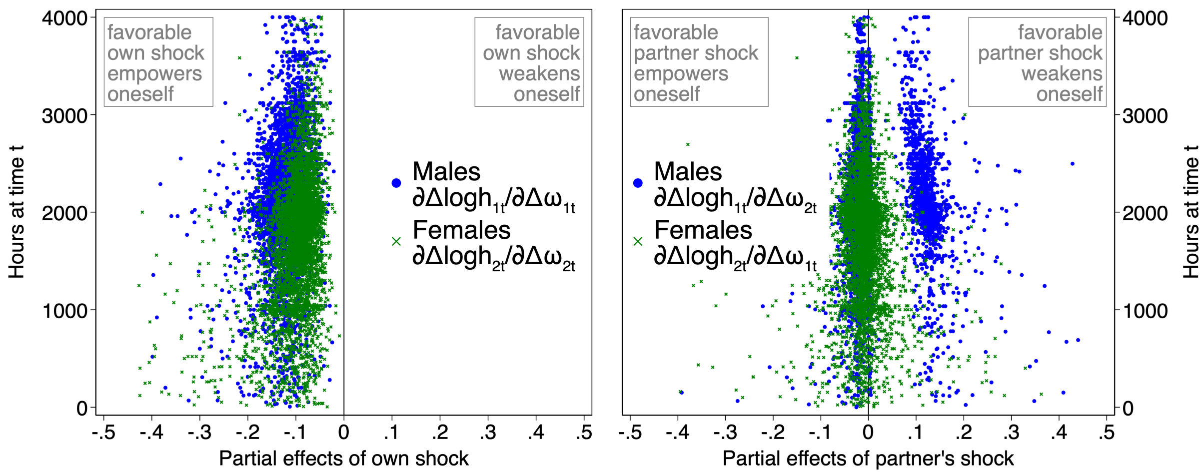
We estimate the average partial effects of immediately past shocks (from $t-1$ in panel 1b) at $\mathbb{E}(\partial\Delta\log h_{2t}/\partial\omega_{2t-1}) < 0$ and $\mathbb{E}(\partial\Delta\log h_{1t}/\partial\omega_{2t-1}) > 0$, exactly as limited commitment requires. The other two average partial effects seem to contradict limited commitment if taken at face value. $\mathbb{E}(\partial\Delta\log h_{1t}/\partial\omega_{1t-1})$ is weakly positive but the underlying parameters are not statistically significant; $\mathbb{E}(\partial\Delta\log h_{2t}/\partial\omega_{1t-1})$ is weakly negative but the majority of households exhibit *positive* effects exactly as limited commitment postulates.

The partial effects of the partner's current shocks (panel 1a) are mostly positive among men (so a favorable shock on the wife's side increases the husband's hours, consistent with non-full commitment) but spread around zero among women.

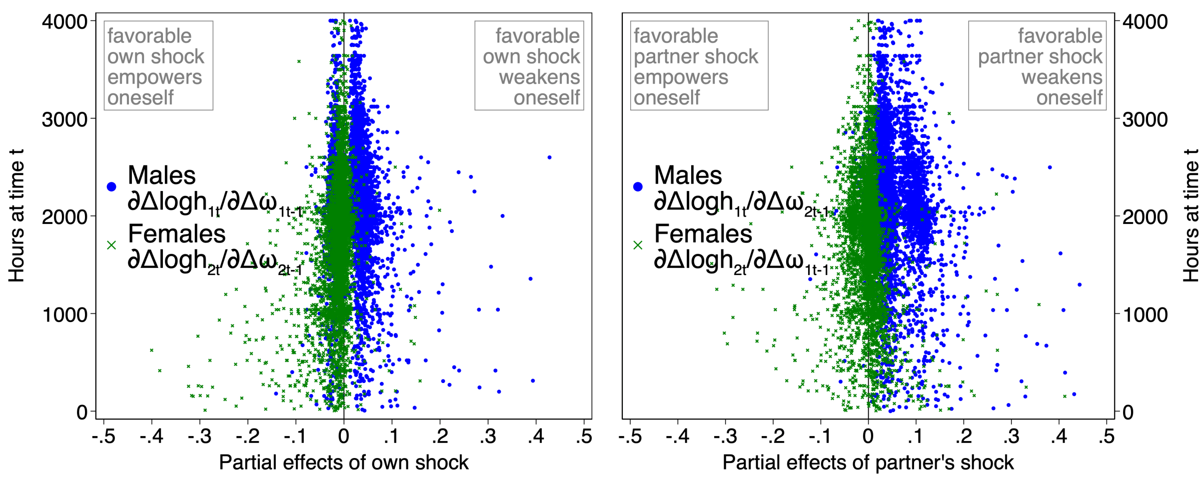
The partial effects are in fact elasticities of labor supply w.r.t wage shocks. As the effects of past shocks lie on average between 0.01-0.05 in absolute value, a 10% wage change shifts hours by 0.1%-0.5%, with the direction determined by the sign of the elasticity. Past shocks exclusively induce *bargaining* effects, so this gives a sense of the average magnitude of bargaining. However, there is large heterogeneity; clearly, many couples exhibit full commitment (null bargaining effects), even if the results for the average or under homogeneity point to limited commitment. Additional results not shown here suggest that *older* couples in their *first* marriage are likelier to exhibit full commitment, as one would expect.

[53]For brevity, we only show results from the smaller sample over four time periods, i.e. with shocks from $t-2$ in the equation. Results from the baseline sample over three periods offer similar conclusions.

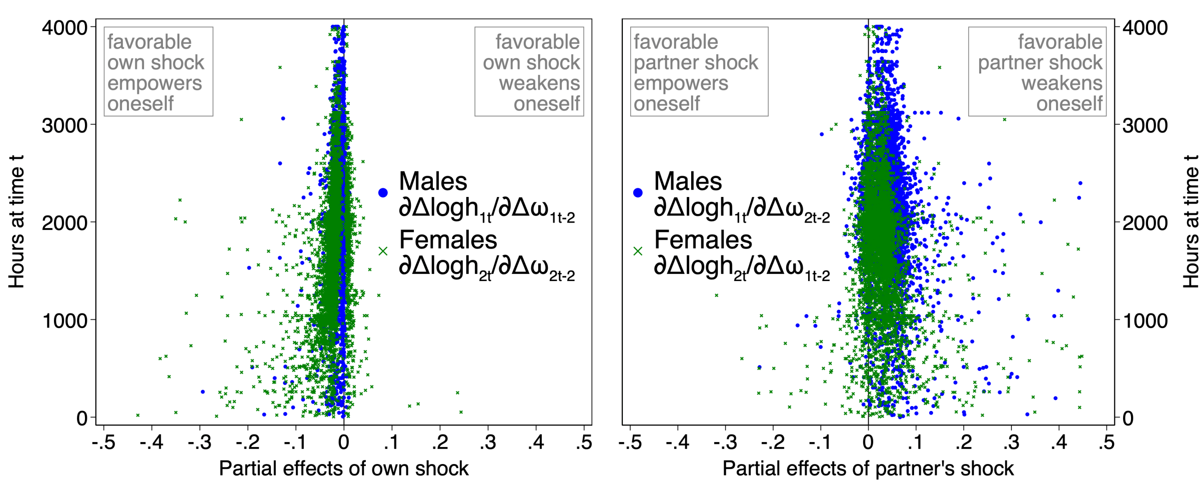
Figure 1: Partial effects of wage shocks



(a) $\partial \Delta \log h_{jt}/\partial \omega_{kt}$, partial effects of current shocks



(b) $\partial \Delta \log h_{jt}/\partial \omega_{kt-1}$, partial effects of immediately past shocks



(c) $\partial \Delta \log h_{jt}/\partial \omega_{kt-2}$, partial effects of older shocks

Notes: The figure plots the partial derivative of hours w.r.t wage shocks, $\partial \Delta \log h_{jt}/\partial \omega_{kt-\tau}$, $j, k \in \{1, 2\}$, $\tau \in \{0, 1, 2\}$, across couples observed for ≥ 4 periods. The parameter estimates are in appendix table E.5.

Table 3: Summary statistics of partial effects of wage shocks

	FC	NC	LC	mean	st.dev.	p10	p50	p90
Partial effects of current shocks (t)								
$\partial\Delta \log h_{1t}/\partial\omega_{1t}$	.	.	.	-0.117	0.247	-0.153	-0.116	-0.085
$\partial\Delta \log h_{2t}/\partial\omega_{2t}$	.	.	.	-0.111	0.563	-0.138	-0.089	-0.060
$\partial\Delta \log h_{1t}/\partial\omega_{2t}$	0	+	+	0.011	0.242	-0.031	-0.019	0.126
$\partial\Delta \log h_{2t}/\partial\omega_{1t}$	0	+	+	-0.007	0.631	-0.043	-0.010	0.021
Partial effects of immediately past shocks $(t-1)$								
$\partial\Delta \log h_{1t}/\partial\omega_{1t-1}$	0	0	$-$	0.028	0.136	-0.022	0.030	0.051
$\partial\Delta \log h_{2t}/\partial\omega_{2t-1}$	0	0	$-$	-0.028	0.754	-0.035	-0.008	0.005
$\partial\Delta \log h_{1t}/\partial\omega_{2t-1}$	0	0	+	0.058	0.080	0.023	0.042	0.109
$\partial\Delta \log h_{2t}/\partial\omega_{1t-1}$	0	0	+	-0.008	0.370	-0.034	0.003	0.019
Partial effects of older shocks $(t-2)$								
$\partial\Delta \log h_{1t}/\partial\omega_{1t-2}$	0	0	$-$	-0.009	0.020	-0.021	-0.004	-0.001
$\partial\Delta \log h_{2t}/\partial\omega_{2t-2}$	0	0	$-$	-0.028	0.158	-0.043	-0.021	0.007
$\partial\Delta \log h_{1t}/\partial\omega_{2t-2}$	0	0	+	0.047	0.156	0.002	0.045	0.070
$\partial\Delta \log h_{2t}/\partial\omega_{1t-2}$	0	0	+	0.032	0.340	-0.004	0.027	0.057

Notes: The table reports key summary statistics of the distribution of partial effects of wage shocks across households observed for ≥ 4 periods. The parameter estimates are in appendix table E.5.

5.2 Wages and BMI

We use additional distribution factors as a means of over-identification. Following Chiappori et al. (2012) and Dupuy and Galichon (2014), we select the spouses' body mass index as time-varying distribution factor in addition to wages. The underlying premise is that shifts in one's body mass influence their attractiveness in the marriage market, thus affecting their bargaining power at home. We re-estimate all specifications activating $Z_{t-\tau} = \{BMI_{1t-\tau}, BMI_{2t-\tau}\}$, $\tau \in \{0, 1, 2\}$, and report results in columns 5-8 in appendix tables E.2 (reduced form), E.3 (structural), and E.4 (proportionality restrictions).[54] The bargaining effects of wages are unchanged from the baseline, pointing again towards limited commitment. The bargaining effects of BMI are also in line with limited commitment: an increase in one's *past* BMI increases his/her hours (as if it weakens one's Pareto weight because that person became relatively less attractive) while, by contrast, an increase in the *partner's past* BMI reduces work (as if the opposite reasons hold). Statistical significance is low but most parameters that *are* significant have the sign that limited commitment postulates.

The use of BMI as a distribution factor is debatable because shifts in body mass may reflect endogenous choices or affect labor supply directly. But if such shifts exclusively reflected choices, it is unclear why *past* BMI would affect current labor supply, as we find

[54]Results with heterogeneity lead to similar conclusions. We do not include them for brevity.

here, beyond its effect on current BMI that we explicitly control for. Moreover, any *direct* effect that BMI has on labor supply would typically be negative (a weight increase limits one's ability to work), which is opposite of what we find here.

6 Discussion

We aimed to keep our discussion as simple as possible, so our model purposefully abstracted from a number of features at the intersection of household decision making and commitment that may matter for the formulation of our test. We briefly comment below on three features, namely home production, human capital, and labor market participation.

Suppose that, as in Lise and Yamada (2019), the public good q_t is produced domestically via the home production function $q_t = f(x_t, d_{1t}, d_{2t})$, where x_t is money expenditure and d_{jt} is spouse j's housework time. We show in appendix B that the estimating equation for hours is similar to the baseline up to additive terms for money expenditure (in lieu of consumption) and the spouses' housework times. The exclusion restrictions on current and past distribution factors (incl. wages) remain intact and our test thus retains its original form. We re-estimate all specifications allowing for home production and report results in appendix table E.6. Our main finding remains: own past wage shocks reduce labor supply while the partner's current and past shocks increase it, in line with limited commitment.[55,56]

Suppose that, as in Eckstein and Wolpin (1989), wages depend on work experience, a form of human capital, which accumulates endogenously with the spouses' hours choice over time. This is an interesting extension because it creates dynamic links on top of savings and more clearly affects the outside options in limited commitment since human capital is assignable. Our intuition here is that if we control for individual human capital similarly to how we control for assets, the test retains its original form based on shocks to the *exogenous* component of wages. We do not fully observe the work history of individuals in the PSID, let alone other forms of human capital, so we leave this extension to future research. But omitted human capital would not explain the effects we find from past shocks to future labor supply. Any neglected dynamics that affect one's future earnings would typically cause symmetric shifts in *both* spouses' labor supply (e.g. an income or wealth effect). This is in contrast to the *asymmetric* effects we observe here, where one's past shocks reduce one's labor supply *and* increase the partner's, as limited commitment precisely requires.

[55]We report results from the reduced form specification only; results from the other specifications lead to similar conclusions but we do not show them for brevity. Statistical significance is lower than in baseline because we estimate a more flexible model over a smaller sample (we do not observe housework for everyone).

[56]An extension to joint leisure, as in Cosaert et al. (2022), is similar: the estimating equation includes additive terms for joint leisure and the commitment test retains its original form.

An extension to the participation margin of labor supply is conceptually straightforward; see Blundell et al. (2007) and Voena (2015). We do not model it here because our estimating equation relies on the log-linearization of the agents' marginal utility, which is not possible with discrete outcomes. We would thus have to resort to a numerical solution to a fully specified model, subject to the earlier limitations. The exclusion restrictions of distribution factor are independent of the log-linearization, therefore our test based on the role of current and past shocks remains conceptually unaffected by the lack of extensive margin. Empirically, our results are sensitive to this choice only to the extent that those *not* participating operate in a different commitment mode than the rest. While full commitment facilitates specialization (so those not working may operate in full commitment), it is hard to believe that this would meaningfully change our results in light of the very high participation rates.

7 Conclusions

Many policies that entail an intertemporal aspect (from conditional cash transfers to divorce and property division rules to child support) cannot be analyzed without reference to some model of household behavior. A particularly important aspect is commitment, the extent to which the spouses commit to a plan that disciplines their behavior in the future.

In this paper we ask *to what extent spouses commit*. Using a lifecycle collective model, we characterize household behavior in three prominent regimes: full, limited, and no commitment. Current and past news affect the allocation of resources differently in each case. Full commitment is nested within no commitment in terms of the information that matters for such allocation, which in turn is nested within limited commitment. Nesting and natural exclusion restrictions from contemporaneous and historical information allows us to devise a test that distinguishes between the three alternatives.

We consistently reject full and no commitment in the PSID. By contrast, we find strong evidence for limited commitment, albeit with large heterogeneity. Favorable current and past shocks from 2 and 4 years ago decrease one's labor supply and increase their partner's. This occurs even though our model controls for substitution, income, wealth, and tax adjustments that such shocks may induce. We show that these asymmetric effects are consistent with a power shift in the couple, in which favorable news improve the bargaining power of the recipient spouse and, through that, reduce own labor supply and raise the partner's.

To the best of our knowledge, ours is the first paper that brings the three commitment alternatives together, contrasts their implications for behavior, and proposes a test that distinguishes between them. The insights we provide are applicable to a broad range of risk sharing arrangements, such as risk sharing among village households.

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Online Appendix

A Recursive formulation of household problem

Full commitment. The value function at $t = 0$ is given by (2). Pooling terms together and setting $t_0 = 0$ yields

$$V_{t_0}^{\mathrm{FC}}(\Omega_{t_0}) = \max_{\{C_t\}_{t_0 \le t \le \bar{t}, \boldsymbol{\omega}_t \in \Omega_t}} \mathbb{E}_{t_0} \sum_{t=t_0}^{\bar{t}} \beta^{t-t_0} \Big(\mu_1(\Theta_0) u_1(q_t, h_{1t}) + \mu_2(\Theta_0) u_2(q_t, h_{2t}) \Big) \tag{A.1}$$

where $C_t = \{q_t, h_{1t}, h_{2t}, a_{t+1}\}$ is the set of household choice variables in period t and state $\boldsymbol{\omega}_t \in \Omega_t$. To ease the notation, we subsequently drop the explicit conditioning of choices on $\boldsymbol{\omega}_t$. Splitting the sum in two parts, one for $t_0 = 0$ and another from $t_1 = 1$ to $\bar{t}$, yields

$$\begin{aligned} V_{t_0}^{\mathrm{FC}}(\Omega_{t_0}) = \max_{C_{t_0}} \ & \mu_1(\Theta_0) u_1(q_{t_0}, h_{1t_0}) + \mu_2(\Theta_0) u_2(q_{t_0}, h_{2t_0}) \\ & + \beta \max_{\{C_t\}_{t_1 \le t \le \bar{t}}} \mathbb{E}_{t_0} \sum_{t=t_1}^{\bar{t}} \beta^{t-t_1} \Big(\mu_1(\Theta_0) u_1(q_t, h_{1t}) + \mu_2(\Theta_0) u_2(q_t, h_{2t}) \Big). \end{aligned}$$

Given (A.1), we may replace the last part with $V_{t_1}^{\mathrm{FC}}$ to obtain

$$V_{t_0}^{\mathrm{FC}}(\Omega_{t_0}) = \max_{C_{t_0}} \ \mu_1(\Theta_0) u_1(q_{t_0}, h_{1t_0}) + \mu_2(\Theta_0) u_2(q_{t_0}, h_{2t_0}) + \beta \mathbb{E}_{t_0} V_{t_1}^{\mathrm{FC}}(\Omega_{t_1}).$$

For a generic period t, this Bellman equation generalizes to become

$$V_t^{\mathrm{FC}}(\Omega_t) = \max_{C_t} \ \mu_1(\Theta_0) u_1(q_t, h_{1t}) + \mu_2(\Theta_0) u_2(q_t, h_{2t}) + \beta \mathbb{E}_t V_{t+1}^{\mathrm{FC}}(\Omega_{t+1}), \tag{A.2}$$

which is clearly a special case of the general recursive form (5) in the paper if $\mu_{jt} = \mu_j(\Theta_0)$, $j \in \{1, 2\}$, i.e. the familiar time-invariance of the Pareto weight under full commitment.

Limited commitment. The value function at $t = 0$ is given by (3). We can incorporate the participation constraints into the objective function using a Lagrangian multiplier method (Messner et al., 2012; Marcet and Marimon, 2019), which yields

$$\begin{aligned} V_0^{\mathrm{LC}}(\Omega_0) = \max_{\{C_t\}_{0 \le t \le \bar{t}, \boldsymbol{\omega}_t \in \Omega_t}} \ & \mu_1(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_1(q_t, h_{1t}) \right) + \mu_2(\Theta_0) \left(\mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t u_2(q_t, h_{2t}) \right) \\ & + \sum_{t=1}^{\bar{t}} \beta^t \sum_j \nu_{jt} \left(\mathbb{E}_t \sum_{\tau=t}^{\bar{t}} \beta^{\tau-t} u_j(q_\tau, h_{j\tau}) - \widetilde{V}_{jt}(X_{jt}, w_{jt}, Z_{jt}, a_t) \right), \end{aligned}$$

where ν_{jt} is the Lagrange multiplier on spouse j's participation constraint at t. As such, ν_{jt} depends on the variables that the underlying constraint also depends on, namely X_{jt}, w_{jt}, Z_{jt}, and a_t that affect the *outside* option, and a number of variables described below that affect the *inside* option.

The individual and household characteristics X_t, wages W_t, and wealth a_t affect optimal household choices in limited commitment through their effect on preferences and/or the budget set. The inside value of person j reflects such choices, so it varies with X_t, W_t, a_t. The inside value also varies with the applicable Pareto weight in the period/state. However, an important distinction must be made here. Suppose that there is a Pareto weight at the *start* of period t, i.e. after the state of the world manifests but before decisions are made in the period, and a potentially different Pareto weight at the *end* of period t. Let's call the first weight μ_{jt-1}; this determines what share of the marital surplus accrues to j at the *start* of t. Whether the participation constraint binds at the *start* of period t depends on μ_{jt-1}. This is ultimately what matters for decision making later on in the period, so the Lagrange multiplier on spouse j's participation constraint depends on μ_{jt-1}.[1]

Pooling together the variables that affect j's participation constraint in period t, we may express its Lagrange multiplier as $\nu_{jt} = \nu_j(X_t, W_t, Z_{jt}, a_t, \mu_{jt-1})$.[2] Assuming that X_t affects the inside and outside options similarly, it follows that X_t does not impact the participation constraint. We thus conclude that $\nu_{jt} = \nu_j(W_t, Z_{jt}, a_t, \mu_{jt-1})$.

Following Marcet and Marimon (2019), we use standard algebra and the law of iterated expectations to pool common terms together and write the value function as

$$\begin{aligned} V_0^{\text{LC}}(\Omega_0) = \max_{\{C_t\}_{0\leq t\leq \bar{t},\omega_t\in\Omega_t}} \mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \Big(& \mu_1(W_t, Z_{1t}, a_t, \mu_{1t-1}) u_1(q_t, h_{1t}) \\ & + \mu_2(W_t, Z_{2t}, a_t, \mu_{2t-1}) u_2(q_t, h_{2t}) + g_t(a_t) \Big), \end{aligned} \tag{A.3}$$

where $\mu_{jt} \equiv \mu_j(W_t, Z_{jt}, a_t, \mu_{jt-1}) = \mu_{jt-1} + \nu_j(W_t, Z_{jt}, a_t, \mu_{jt-1})$ with $\mu_{j0} = \mu_j(\Theta_0)$, $j \in \{1, 2\}$, and $g_t(a_t) = -\nu_{1t}\widetilde{V}_{1t}(X_{1t}, w_{1t}, Z_{1t}, a_t) - \nu_{2t}\widetilde{V}_{2t}(X_{2t}, w_{2t}, Z_{2t}, a_t)$ aggregates the spouses' outside options that depend on endogenous assets.

Following similar algebra to the case of full commitment and admitting that bargaining power is relative in the household (therefore $Z_t = \{Z_{1t}, Z_{2t}\}$ enters both spouses' Pareto weights through the implicit constraint $\mu_{1t} + \mu_{2t} = constant$), (A.3) has a recursive structure

[1]The nature of decision making, as shown subsequently, ensures that the participation constraints are satisfied for the applicable weight μ_{jt} at the end of the period. Moreover, no further updating of the weight takes place before decision making in the following period, therefore μ_{jt} at the end of t is also the applicable weight at the start of $t+1$. By deduction, μ_{jt-1} is therefore the weight that materialized at the end of $t-1$.

[2]Recall that $X_{jt} \subseteq X_t$, so X_t summarizes the demographic and tax characteristics of couples and singles.

which, for a generic period t, is given by

$$\begin{aligned} V_t^{\mathrm{LC}}(\Omega_t) = & \max_{C_t} \ \mu_1(W_t, Z_t, a_t, \mu_{1t-1}) u_1(q_t, h_{1t}) + \mu_2(W_t, Z_t, a_t, \mu_{2t-1}) u_2(q_t, h_{2t}) \\ & + g_t(a_t) + \beta \mathbb{E}_t V_{t+1}^{\mathrm{LC}}(\Omega_{t+1}). \end{aligned} \tag{A.4}$$

This is a special case of the general recursive form (5) in the paper if $\mu_{jt} \equiv \mu_j(W_t, Z_t, a_t, \mu_{jt-1})$, subject to the restriction $\mu_{jt} = \mu_{jt-1} + \nu_{jt}$ and $\mu_{j0} = \mu_j(\Theta_0)$, $j \in \{1, 2\}$, i.e. the familiar step function of the Pareto weight in limited commitment (e.g. Mazzocco, 2007; Voena, 2015).

No commitment. The value function at $t = 0$ is given by (4). Pooling terms together and setting $t_0 = 0$ yields

$$\begin{aligned} & V_{t_0}^{\mathrm{NC}}(\Omega_{t_0}) = \\ & \max_{\{C_t\}_{t_0 \le t \le \bar{t}, \boldsymbol{\omega}_t \in \Omega_t}} \mathbb{E}_{t_0} \sum_{t=t_0}^{\bar{t}} \beta^{t-t_0} \Big(\mu_1(\Theta_0, W_t, Z_t, a_t) u_1(q_t, h_{1t}) + \mu_2(\Theta_0, W_t, Z_t, a_t) u_2(q_t, h_{2t}) \Big). \end{aligned} \tag{A.5}$$

Following similar algebra to the case of full commitment, (A.5) has a recursive structure which, for a generic period t, is given by

$$\begin{aligned} V_t^{\mathrm{NC}}(\Omega_t) = & \max_{C_t} \ \mu_1(\Theta_0, W_t, Z_t, a_t) u_1(q_t, h_{1t}) + \mu_2(\Theta_0, W_t, Z_t, a_t) u_2(q_t, h_{2t}) \\ & + \beta \mathbb{E}_t V_{t+1}^{\mathrm{NC}}(\Omega_{t+1}). \end{aligned} \tag{A.6}$$

This is a special case of the general recursive form (5) in the paper if $\mu_{jt} = \mu_j(\Theta_0, W_t, Z_t, a_t)$, $j \in \{1, 2\}$, i.e. the familiar flexible dependence of the Pareto weight on contemporaneous information under no commitment.

B Derivation and approximation of static optimality conditions

Baseline model without home production. The easiest way to derive the general problem's static optimality conditions is to fold (5) back to its non-recursive counterpart and form the Lagrangian function. This is given by

$$\mathcal{L} = \mathbb{E}_0 \sum_{t=0}^{\bar{t}} \beta^t \Big\{ \sum_j \mu_{jt} u_j(q_t, h_{jt}; \boldsymbol{\xi}_{jt}) + g_t(a_t) + \lambda_t \big((1 + r) a_t + (1 - \chi_t) y_t^{1-\kappa_t} - q_t - a_{t+1} \big) \Big\},$$

where λ_t is the multiplier on the sequential budget constraint, in which we have replaced $\tau(y_t; \boldsymbol{\psi}_t)$ by $(1-\chi_t)y_t^{1-\kappa_t}$. We leave the restrictions on the Pareto weight implicitly in the background. Suppose that period utility is given by $u_j(q_t, h_{jt}; \boldsymbol{\xi}_{jt}) = \ddot{u}_j(\ddot{q}_t, \ddot{h}_{jt})$ where $\ddot{q}_t = q_t \exp(-\boldsymbol{\pi}_j^{q\prime}\boldsymbol{\xi}_{jt})$, $\ddot{h}_{jt} = h_{jt}\exp(-\boldsymbol{\pi}_j^{h\prime}\boldsymbol{\xi}_{jt})$, and $\boldsymbol{\pi}_j^q$ and $\boldsymbol{\pi}_j^h$ are parameters that load the taste observables onto consumption and hours. The static first order condition for hours is given by $-\mu_{jt}\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt})\exp(-\boldsymbol{\pi}_j^{h\prime}\boldsymbol{\xi}_{jt}) = \lambda_t(1-\chi_t)(1-\kappa_t)y_t^{-\kappa_t}w_{jt}$ for $j \in \{1,2\}$; this can be alternatively obtained directly from the Bellman equation (5) for λ_t equal to the costate variable $\beta\mathbb{E}_t\partial V_{t+1}/\partial a_{t+1}$ (expected discounted marginal value of wealth).

Taking logs and a first difference in time yields $\Delta\log\mu_{jt} + \Delta\log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt})) - \boldsymbol{\pi}_j^{h\prime}\Delta\boldsymbol{\xi}_{jt} = \Delta\log\lambda_t + \Delta\log(1-\chi_t)(1-\kappa_t) - \Delta\kappa_t\log y_t + \Delta\log w_{jt}$. Estimation of this expression is impossible outside of a parametrized model because $\ddot{u}_{j[h]}$ is unknown. To make progress, we follow Blundell et al. (2016) and expand $\ddot{u}_{j[h]}$ around its arguments one period ago. A first order Taylor approximation of $\log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt}))$ around q_{t-1} and h_{jt-1} yields

$$\log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt})) \approx \log(-\ddot{u}_{j[h]}(\ddot{q}_{t-1}, \ddot{h}_{jt-1})) + \frac{\ddot{u}_{j[hq]}}{\ddot{u}_{j[h]}}\ddot{q}_{t-1}\Delta\log q_t + \frac{\ddot{u}_{j[hh]}}{\ddot{u}_{j[h]}}\ddot{h}_{jt-1}\Delta\log h_{jt},$$

where we use $\Delta x_t \approx x_{t-1}\Delta\log x_t$ for small changes in the generic variable x. Plugging this into the log differenced optimality condition and rearranging yields

$$\begin{aligned}\Delta\log h_{jt} \approx \alpha_j h_{jt-1}^{-1}\big(&\boldsymbol{\pi}_j^{h\prime}\Delta\boldsymbol{\xi}_{jt} + \Delta\log(1-\chi_t)(1-\kappa_t) - \Delta\kappa_t\log y_t \\ &+ \Delta\log\lambda_t - \zeta_j q_{t-1}\Delta\log q_t + \Delta\log w_{jt} - \Delta\log\mu_{jt}\big),\end{aligned}$$

where $\alpha_j = \ddot{u}_{j[h]}/(\ddot{u}_{j[hh]}\exp(-\boldsymbol{\pi}_j^{h\prime}\boldsymbol{\xi}_{jt-1}))$, $\zeta_j = (\ddot{u}_{j[hq]}\exp(-\boldsymbol{\pi}_j^{q\prime}\boldsymbol{\xi}_{jt-1}))/\ddot{u}_{j[h]}$, and all first and second order partial utilities are timed at $t-1$. α_j is strictly positive by our regularity assumptions on period utility, while ζ_j is positive if consumption and leisure are substitutes, negative if they are complements, and zero if preferences are separable between consumption and hours. $\alpha_j h_{jt-1}^{-1}$ is approximately equal to spouse j's Frisch elasticity of labor supply and exactly equal if preferences are separable (Blundell et al., 2016).

Writing $\Delta\kappa_t\log y_t \approx \kappa_{t-1}(s_{jt-1}\Delta\log y_{jt} + s_{-jt-1}\Delta\log y_{-jt})$, where $\Delta\log y_{jt}$ is the growth rate of spouse j's earnings and $s_{jt} \geq 0$ is j's share of family earnings, replacing own earnings with $y_{jt} = w_{jt}h_{jt}$, assuming for simplicity that $\kappa_t = \kappa_{t-1}$ (the progressivity tax parameter does not change between proximate periods), and pooling common terms together yields

$$\begin{aligned}\Delta\log h_{jt} = {}&\delta_j\boldsymbol{\pi}_j^{h\prime}h_{jt-1}^{-1}\Delta\boldsymbol{\xi}_{jt} + \delta_j h_{jt-1}^{-1}\Delta\log(1-\chi_t) - \delta_j\kappa_t s_{-jt-1}h_{jt-1}^{-1}\Delta\log y_{-jt} \\ &+ \delta_j h_{jt-1}^{-1}\Delta\log\lambda_t - \delta_j\zeta_j q_{t-1}h_{jt-1}^{-1}\Delta\log q_t \\ &+ \delta_j(1-\kappa_t s_{jt-1})h_{jt-1}^{-1}\Delta\log w_{jt} - \delta_j h_{jt-1}^{-1}\Delta\log\mu_{jt},\end{aligned}$$

where $\delta_j = \left(\alpha_j^{-1} + \kappa_t s_{jt-1} h_{jt-1}^{-1}\right)^{-1} > 0$, $j \in \{1,2\}$, and $-j$ indicates j's partner. This is expression (6) in the main text.

Extended model with home production. The model with home production has the same recursive formulation (5) as the baseline problem, subject to additional constraints: a home production function for the consumption good and a time budget per spouse. We can remove the first constraint by replacing the consumption good q_t with $f(x_t, d_{1t}, d_{2t})$, where x_t is market expenditure and d_{jt} is chores by spouse $j \in \{1,2\}$. The Lagrangian includes additively the time budgets times their Lagrange multipliers but it is otherwise similar to the baseline. Consequently, the static first order condition for hours is similar to the baseline up to the Lagrange multiplier on own time budget that enters additively on the right hand side. Assuming that the time budget is slack and its multiplier is zero (which is a reasonable approximation for small changes in hours and chores) yields the same first order condition as in the baseline. Taking logs and a first difference in time then yields $\Delta \log \mu_{jt} + \Delta \log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt})) - \boldsymbol{\pi}_j^{h\prime} \Delta \boldsymbol{\xi}_{jt} = \Delta \log \lambda_t + \Delta \log(1-\chi_t)(1-\kappa_t) - \Delta\kappa_t \log y_t + \Delta \log w_{jt}$.

A first order Taylor approximation of $\log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt}))$ around x_{t-1}, d_{1t-1}, d_{2t-1} (the inputs that determine q_{t-1}) and h_{jt-1} yields

$$
\begin{aligned}
\log(-\ddot{u}_{j[h]}(\ddot{q}_t, \ddot{h}_{jt})) \approx \log(-\ddot{u}_{j[h]}(\ddot{q}_{t-1}, \ddot{h}_{jt-1})) &+ \frac{\ddot{u}_{j[hq]}}{\ddot{u}_{j[h]}} \exp(-\boldsymbol{\pi}_j^{q\prime} \boldsymbol{\xi}_{jt-1}) f_x x_{t-1} \Delta \log x_t \\
&+ \frac{\ddot{u}_{j[hq]}}{\ddot{u}_{j[h]}} \exp(-\boldsymbol{\pi}_j^{q\prime} \boldsymbol{\xi}_{jt-1}) \sum_k f_{d_k} d_{kt-1} \Delta \log d_{kt} \\
&+ \frac{\ddot{u}_{j[hh]}}{\ddot{u}_{j[h]}} \ddot{h}_{jt-1} \Delta \log h_{jt},
\end{aligned}
$$

where $f_x = \partial f / \partial x_t > 0$ and $f_{d_k} = \partial f / \partial d_{kt} > 0$, for $k \in \{1,2\}$, are the marginal productivity of market goods and chores. All partial derivatives of the utility and home production functions are timed at $t-1$ given the nature of the log-linearization. Plugging this into the log differenced optimality condition and following the same steps as in the baseline yields

$$
\begin{aligned}
\Delta \log h_{jt} = {}& \delta_j \boldsymbol{\pi}_j^{h\prime} h_{jt-1}^{-1} \Delta \boldsymbol{\xi}_{jt} + \delta_j h_{jt-1}^{-1} \Delta \log(1-\chi_t) - \delta_j \kappa_t s_{-jt-1} h_{jt-1}^{-1} \Delta \log y_{-jt} \\
&+ \delta_j h_{jt-1}^{-1} \Delta \log \lambda_t - \delta_j \zeta_j f_x x_{t-1} h_{jt-1}^{-1} \Delta \log x_t - \textstyle\sum_k \delta_j \zeta_j f_{d_k} d_{kt-1} h_{jt-1}^{-1} \Delta \log d_{kt} \\
&+ \delta_j (1 - \kappa_t s_{jt-1}) h_{jt-1}^{-1} \Delta \log w_{jt} - \delta_j h_{jt-1}^{-1} \Delta \log \mu_{jt},
\end{aligned}
$$

where $\delta_j = \left(\alpha_j^{-1} + \kappa_t s_{jt-1} h_{jt-1}^{-1}\right)^{-1} > 0$, $j \in \{1,2\}$, $k \in \{1,2\}$, $-j$ indicates j's partner, and α_j and ζ_j are defined as above. The linearized optimality condition with home production is similar to the baseline up to the additional controls for the production inputs.

C Approximation of general Pareto weight

Consider the most general Pareto weight, i.e. that of limited commitment, given by $\mu_{jt} = \mu_j(W_t, Z_t, a_t, \mu_{jt-1})$ with $\mu_{j0} = \mu_j(\Theta_0)$, $j \in \{1, 2\}$. To simplify the discussion momentarily, let μ_{jt} be a function of one stochastic distribution factor $z_t \in Z_t$ and the past Pareto weight only, i.e. $\mu_{jt} = \mu_j(z_t, \mu_{jLt})$, and let μ_{j0} be a function of one initial factor $\theta_0 \in \Theta_0$. Here the index Lt denotes the first lag before t, so $\mu_{jLt} \equiv \mu_{jt-1}$. Suppose that $\ddot{\mu}_j(z_t, \mu_{jLt})$ is the smooth approximation of $\mu_j(z_t, \mu_{jLt})$. A first order Taylor approximation of $\log \ddot{\mu}_j(z_t, \mu_{jLt})$ around z_{t-1} and μ_{jLt-1} yields

$$\begin{aligned}\log \ddot{\mu}_j(z_t, \mu_{jLt}) &\approx \log \ddot{\mu}_j(z_{t-1}, \mu_{jLt-1}) + \ddot{\mu}_j(z_{t-1}, \mu_{jLt-1})^{-1} \\ &\quad \times \left\{ z_{t-1} \frac{\partial \ddot{\mu}_j}{\partial z}(z_{t-1}, \mu_{jLt-1}) \Delta \log z_t + \mu_{jLt-1} \frac{\partial \ddot{\mu}_j}{\partial \mu_{jL}}(z_{t-1}, \mu_{jLt-1}) \Delta \log \mu_{jLt} \right\} \\ &\approx \log \ddot{\mu}_j(z_{t-1}, \mu_{jLt-1}) + e_{\mu_j,z}(z_{t-1}, \mu_{jLt-1}) \Delta \log z_t + e_{\mu_j,\mu_{jL}}(z_{t-1}, \mu_{jLt-1}) \Delta \log \mu_{jLt},\end{aligned}$$

where $\Delta \log \mu_{jLt} = \log \mu_{jLt} - \log \mu_{jLt-1} = \log \mu_{jt-1} - \log \mu_{jt-2}$ and we use again $\Delta x_t \approx x_{t-1} \Delta \log x_t$ for small changes in the generic variable x. The elasticities $e_{\mu_j,z}$ and $e_{\mu_j,\mu_{jL}}$ are quasi-structural parameters for the sensitivity of the Pareto weight to the distribution factor and past bargaining power. From the nature of the approximation, these elasticities depend on the *past* levels of *all* the variables that enter $\ddot{\mu}_j$, in this case z_{t-1} and μ_{jLt-1}. By recursive substitution, we can remove the right hand side Pareto weight and obtain

$$\begin{aligned}\Delta \log \mu_{jt} &\approx \sum_{\tau=0}^{t-1} \left(\prod_{\iota=1}^{\tau} e_{\mu_j,\mu_{jL}}(z_{t-\iota}, \mu_{jLt-\iota}) \right) e_{\mu_j,z}(z_{t-\tau-1}, \mu_{jLt-\tau-1}) \Delta \log z_{t-\tau} \\ &\quad + \left(\prod_{\iota=1}^{t} e_{\mu_j,\mu_{jL}}(z_{t-\iota}, \mu_{jLt-\iota}) \right) e_{\mu_j,\theta} \theta_0 \\ &\approx \sum_{\tau=0}^{t-1} e^{\tau}_{\mu_j,\mu_{jL}}(z_{t-1}, \mu_{jLt-1}) e_{\mu_j,z}(z_{t-\tau-1}, \mu_{jLt-\tau-1}) \Delta \log z_{t-\tau} \\ &\quad + e^{t}_{\mu_j,\mu_{jL}}(z_{t-1}, \mu_{jLt-1}) e_{\mu_j,\theta} \theta_0,\end{aligned}$$

which is expression (8) in the main text. For the second approximation, we consolidate the notation to $\prod_{\iota=1}^{\tau} e_{\mu_j,\mu_{jL}}(z_{t-\iota}, \mu_{jLt-\iota}) = e^{\tau}_{\mu_j,\mu_{jL}}(z_{t-1}, \mu_{jLt-1})$ and $\prod_{\iota=1}^{t} e_{\mu_j,\mu_{jL}}(z_{t-\iota}, \mu_{jLt-\iota}) = e^{t}_{\mu_j,\mu_{jL}}(z_{t-1}, \mu_{jLt-1})$. Despite the consolidation, the coefficient on $\Delta \log z_{t-\tau}$ still depends on the past levels of the distribution factor through $e_{\mu_j,z}(z_{t-\tau-1}, \mu_{jLt-\tau-1})$.

By the law of motion of the limited commitment weight, $e_{\mu_j,\mu_{jL}} = (1 + \partial \nu_{jt} / \partial \mu_{jt-1}) \times (\mu_{jt-1} / \mu_{jt})$ since $\mu_{jt} = \mu_{jt-1} + \nu_{jt}$. A larger weight at the start of period t (namely μ_{jt-1})

loosens the constraint, so $\partial \nu_{jt}/\partial \mu_{jt-1} < 0$. It follows that, if the constraint binds, $1 + \partial \nu_{jt}/\partial \mu_{jt-1} < 1$, $\mu_{jt-1} < \mu_{jt}$ (the weight increases), and $e_{\mu_j,\mu_{jL}} < 1$. By contrast, if the constraint does not bind, the Pareto weight does not update and $e_{\mu_j,\mu_{jL}} = 1$.

Introducing additional stochastic and initial distribution factors $z_{1t}, z_{2t} \in Z_t$ and $\theta_{10}, \theta_{20} \in \Theta_0$, reinstating wages $w_{1t}, w_{2t} \in W_t$ and assets a_t as arguments in the general Pareto weight, and repeating all previous steps, yields the general log-linear formulation

$$\begin{aligned}\Delta \log \mu_{jt} \approx & \sum_{\tau=0}^{t-1} e^{\tau}_{\mu_j,\mu_{jL}}(\Gamma_{t-1})\Big(e_{\mu_j,w_1}(\Gamma_{t-\tau-1})\Delta \log w_{1t-\tau} + e_{\mu_j,w_2}(\Gamma_{t-\tau-1})\Delta \log w_{2t-\tau}\Big) \\ & + \sum_{\tau=0}^{t-1} e^{\tau}_{\mu_j,\mu_{jL}}(\Gamma_{t-1})\Big(e_{\mu_j,z_1}(\Gamma_{t-\tau-1})\Delta \log z_{1t-\tau} + e_{\mu_j,z_2}(\Gamma_{t-\tau-1})\Delta \log z_{2t-\tau}\Big) \\ & + \sum_{\tau=0}^{t-1} e^{\tau}_{\mu_j,\mu_{jL}}(\Gamma_{t-1}) e_{\mu_j,a}(\Gamma_{t-\tau-1})\Delta \log a_{t-\tau} + e^{t}_{\mu_j,\mu_{jL}}(\Gamma_{t-1})\Big(e_{\mu_j,\theta_1}\theta_{10} + e_{\mu_j,\theta_2}\theta_{20}\Big),\end{aligned}$$

where e_{μ_j,w_k} is the elasticity of j's Pareto weight with respect to k's wage w_{kt}, e_{μ_j,z_k} is the elasticity with respect to z_{kt}, $e_{\mu_j,a}$ is the elasticity with respect to assets, and e_{μ_j,θ_k} is the elasticity of j's weight at marriage with respect to the initial factor θ_{k0}, $k \in \{1, 2\}$. From the nature of the approximation, the elasticities depend on the past levels of *all* arguments of the Pareto weight, namely $\Gamma = \{w_1, w_2, z_1, z_2, a, \mu_{jL}\}$ appropriately timed. The reduced form counterpart is

$$\begin{aligned}\Delta \log \mu_{jt} \approx & \sum_{\tau=0}^{t-1} \Big(\eta^{w_1}_{j\tau}\Delta \log w_{1t-\tau} + \eta^{w_2}_{j\tau}\Delta \log w_{2t-\tau} + \eta^{z_1}_{j\tau}\Delta \log z_{1t-\tau} + \eta^{z_2}_{j\tau}\Delta \log z_{2t-\tau}\Big) \\ & + \sum_{\tau=0}^{t-1} \eta^{a}_{j\tau}\Delta \log a_{t-\tau} + \eta^{\theta_1}_{jt}\theta_{10} + \eta^{\theta_2}_{jt}\theta_{20},\end{aligned}$$

which is the general form of expression (9). The $\eta_{j\tau}$'s are reduced form parameters for the response of j's Pareto weight to the distribution factors $\tau \in \{0, \ldots, t\}$ periods in the past.

D Derivation of estimating equation for hours

Let wage growth be $\Delta \log w_{jt} = \boldsymbol{\pi}^{w\prime}_j \mathbf{x}^w_{jt} + \omega_{jt}$, where $\boldsymbol{\pi}^{w\prime}_j \mathbf{x}^w_{jt}$ is a deterministic profile and ω_{jt} is the wage shock. Let the marginal utility of wealth be $\Delta \log \lambda_t = \ell_{\Delta y}\Delta \log y_t + \ell_{\Delta a}\Delta \log a_t + \ell_y \log y_{t-1} + \ell_a \log a_{t-1}$. Plugging these expressions in (6) and rearranging yields

$$\Delta \log h_{jt} = \delta_j \boldsymbol{\pi}^{h\prime}_j h^{-1}_{jt-1}\Delta \boldsymbol{\xi}_{jt} + \delta_j(1 - \kappa_t s_{jt-1})\boldsymbol{\pi}^{w\prime}_j h^{-1}_{jt-1}\mathbf{x}^w_{jt} + \delta_j h^{-1}_{jt-1}\Delta \log(1 - \chi_t)$$

$$
\begin{aligned}
&+ \delta_j \ell_{\Delta y} h_{jt-1}^{-1} \Delta \log y_t + \delta_j \ell_{\Delta a} h_{jt-1}^{-1} \Delta \log a_t + \delta_j \ell_y h_{jt-1}^{-1} \log y_{t-1} + \delta_j \ell_a h_{jt-1}^{-1} \log a_{t-1} \\
&- \delta_j \kappa_t s_{-jt-1} h_{jt-1}^{-1} \Delta \log y_{-jt} - \delta_j \zeta_j q_{t-1} h_{jt-1}^{-1} \Delta \log q_t \\
&+ \delta_j (1 - \kappa_t s_{jt-1}) h_{jt-1}^{-1} \omega_{jt} - \delta_j h_{jt-1}^{-1} \Delta \log \mu_{jt}.
\end{aligned}
$$

Assume that the deterministic profile of wages does not enter the Pareto weight; select BMI and the age-gap-at-marriage as the time-varying and initial distribution factors respectively. Replacing $\Delta \log \mu_{jt}$ with the reduced form expression for the dependence of the Pareto weight on its arguments and pooling common terms together yields

$$
\begin{aligned}
\Delta \log h_{jt} = &\ \delta_j \boldsymbol{\pi}_j^{h\prime} h_{jt-1}^{-1} \Delta \boldsymbol{\xi}_{jt} + \delta_j (1 - \kappa_t s_{jt-1}) \boldsymbol{\pi}_j^{w\prime} h_{jt-1}^{-1} \mathbf{x}_{jt}^{w} + \delta_j h_{jt-1}^{-1} \Delta \log(1 - \chi_t) \\
&+ \delta_j \ell_{\Delta y} h_{jt-1}^{-1} \Delta \log y_t + \delta_j (\ell_{\Delta a} - \eta_{j0}^{a}) h_{jt-1}^{-1} \Delta \log a_t + \delta_j \ell_y h_{jt-1}^{-1} \log y_{t-1} + \delta_j \ell_a h_{jt-1}^{-1} \log a_{t-1} \\
&- \delta_j \kappa_t s_{-jt-1} h_{jt-1}^{-1} \Delta \log y_{-jt} - \delta_j \zeta_j q_{t-1} h_{jt-1}^{-1} \Delta \log q_t - \delta_j \sum_{\tau=1}^{t-1} \eta_{j\tau}^{a} h_{jt-1}^{-1} \Delta \log a_{t-\tau} \\
&+ \delta_j (1 - \kappa_t s_{jt-1} - \eta_{j0}^{w_j}) h_{jt-1}^{-1} \omega_{jt} - \delta_j \eta_{j0}^{w_{-j}} h_{jt-1}^{-1} \omega_{-jt} \\
&- \delta_j \sum_{\tau=1}^{t-1} \eta_{j\tau}^{w_j} h_{jt-1}^{-1} \omega_{jt-\tau} - \delta_j \sum_{\tau=1}^{t-1} \eta_{j\tau}^{w_{-j}} h_{jt-1}^{-1} \omega_{-jt-\tau} \\
&- \delta_j \sum_{\tau=0}^{t-1} \eta_{j\tau}^{bmi_j} h_{jt-1}^{-1} \Delta \log BMI_{jt-\tau} - \delta_j \sum_{\tau=0}^{t-1} \eta_{j\tau}^{bmi_{-j}} h_{jt-1}^{-1} \Delta \log BMI_{-jt-\tau} \\
&- \delta_j \eta_{jt}^{young_j} h_{jt-1}^{-1} \mathbb{1}[age_j << age_{-j}] - \delta_j \eta_{jt}^{young_{-j}} h_{jt-1}^{-1} \mathbb{1}[age_j >> age_{-j}].
\end{aligned}
$$

Contemporaneous growth in wealth $\Delta \log a_t$ appears as part of the marginal utility of wealth (wealth effect) and in the Pareto weight (bargaining effect); we have pooled both effects together in a single term.

We replace the parameters by a single reduced form coefficient b_j or β_j associated with each term. We then absorb the tax intercept $\delta_j h_{jt-1}^{-1} \Delta \log(1 - \chi_t)$ in the observables term $b_{j[0]} h_{jt-1}^{-1} + \mathbf{b}'_{j[\Delta \xi_{jt}]} h_{jt-1}^{-1} \Delta \boldsymbol{\xi}_{jt}$. This yields the final compact equation (11) in the main text.[3]

Identification. The coefficient on the partner's earnings $b_{j[\Delta y_{-jt}]} = -\delta_j \kappa_t$ is identified from a regression of hours growth $\Delta \log h_{jt}$ on the partner's earnings growth $\Delta \log y_{-jt}$ interacted with past earnings shares s_{-jt-1} and inverse past hours h_{jt-1}^{-1}, controlling for all other variables that appear in (11). We identify the coefficients on all other terms similarly. Fixing the tax progressivity parameter $\kappa_t = 0.185$ as in Blundell et al. (2016) allows us to identify δ_j

[3] In the extended model with home production, the consumption term $-\delta_j \zeta_j q_{t-1} h_{jt-1}^{-1} \Delta \log q_t$ is replaced by $-\delta_j \zeta_j f_x x_{t-1} h_{jt-1}^{-1} \Delta \log x_t - \sum_k \delta_j \zeta_j f_{d_k} d_{kt-1} h_{jt-1}^{-1} \Delta \log d_{kt}$, with associated reduced form coefficients $b_{j[\Delta x_t]} = -\delta_j \zeta_j f_x$ and $b_{j[\Delta d_{kt}]} = -\delta_j \zeta_j f_{d_k}$, for $j, k \in \{1, 2\}$.

from $b_{j[\Delta y_{-jt}]}$. This subsequently enables us to identify the η_j's, the parameters that describe the reduced form dependence of the Pareto weight on the various distribution factors. For example, $b_{j[w_{-jt}]} = -\delta_j \eta_{j0}^{w_{-j}}$ is the coefficient on the partner's current wage shock. Prior identification of δ_j permits identification of $\eta_{j0}^{w_{-j}}$, etc.

In one case (table E.4), we replace the reduced form Pareto weight elasticities η with their structural counterparts from the log-linearized version of the weight in (8). We set $\eta_{j\tau}^{\chi} = (e_{\mu_j,\mu_{jL}})^{\tau} e_{\mu_j,\chi}$ for $\chi \in \{w_1, w_2, bmi_1, bmi_2, a\}$ and $\tau \in \{0,1,2\}$, and $\eta_{jt}^{\theta} = (e_{\mu_j,\mu_{jL}})^t e_{\mu_j,\theta}$ for $\theta = \{\mathbb{1}[age_j << age_{-j}], \mathbb{1}[age_j >> age_{-j}]\}$. This effectively imposes proportionality properties over the various distribution factors as per Bourguignon et al. (2009). In another case (tables 3 and E.5), we allow the elasticities η depend on the immediately past levels of distribution factors. For example, when wages are the sole time-varying distribution factor (tables 3 and E.5), we specify the Pareto weight coefficients η_{j0} on current wages as

$$\begin{aligned}\eta_{j0}^{w_j} &= \eta_{j0}^{w_j\{0\}} + \eta_{j0}^{w_j\{1\}} w_{jt-1} + \eta_{j0}^{w_j\{2\}} w_{-jt-1} \\ \eta_{j0}^{w_{-j}} &= \eta_{j0}^{w_{-j}\{0\}} + \eta_{j0}^{w_{-j}\{1\}} w_{jt-1} + \eta_{j0}^{w_{-j}\{2\}} w_{-jt-1}.\end{aligned}$$

For the case when BMI serves as an additional time-varying distribution factor, we linearly include terms for male and female BMI. We also linearly include terms for the age-gap-at-marriage variables. We specify η_{j1} similarly as a function of time $t-2$ wages (and BMI) and η_{j2} as a function of time $t-3$ wages (and BMI). Identification is analogous to the baseline.

E Additional empirical results

We present sample summary statistics (table E.1) and several additional estimation results:

- Table E.2 reports results from the reduced form (first) specification of the commitment test;
- Table E.3 reports the parameter estimates from the structural (second) specification of the commitment test;
- Table E.4 reports the parameter estimates from the structural (second) specification of the commitment test, letting $\Delta \log \mu_{jt}$ take the log-linear form in (8);
- Table E.5 reports parameter estimates from the structural (third) specification that allows bargaining parameters to depend on the past levels of the distribution factors;
- Table E.6 reports results from the reduced form (first) specification of the commitment test in the extended model with home production.

Table E.1: Summary statistics

	Male $j = 1$		Female $j = 2$	
	mean	st.dev.	mean	st.dev.
Labor market outcomes				
Earnings (annual, in \$1000)	81.74	91.65	47.84	40.25
Hours (annual)	2,231	609	1,758	660
Hours (annual) growth $\Delta \log h_{jt}$	-0.02	0.40	-0.00	0.61
Hourly wage	36.95	37.97	27.32	24.32
Hourly wage growth $\Delta \log w_{jt}$	0.03	0.53	0.04	0.50
Demographics				
Age	43.76	10.46	42.11	10.39
% college education	0.70	0.46	0.77	0.42
BMI	27.80	4.57	24.91	5.49
BMI growth $\Delta \log BMI_{jt}$	0.01	0.07	0.01	0.09

	Household	
	mean	st.dev.
Consumption (annual, in \$1000)	45.08	25.84
Wealth (annual, in \$1000)	416.99	1,269.68
Number of children	1.00	1.10
Age gap at marriage (male-female)	1.65	4.04
Survey waves per household	5.62	2.50
Observations [households × waves]	13,955	

Notes: The table reports averages and standard deviations of key variables in the baseline estimation sample. All monetary amounts are expressed in 2018 dollars.

Table E.2: Commitment test – reduced form results in detail

				wage shocks				**wage shocks & BMI**			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Male	Female	Male	Female	Male	Female	Male	Female
	FC	NC	LC	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
Current shocks (t)											
$\beta_{j[w_{jt}]}$	.	.	.	−30.678	−10.277	−34.754	−16.000	−28.625	−11.410	−63.611	−9.975
				(10.658)	(3.517)	(19.947)	(12.844)	(9.491)	(3.868)	(19.757)	(12.870)
$\beta_{j[w_{-jt}]}$	0	+	+	52.833	−2.553	39.378	−11.346	52.148	5.619	46.119	−5.620
				(26.151)	(6.244)	(30.974)	(18.726)	(24.548)	(9.296)	(31.294)	(19.181)
$\beta_{j[bmi_{jt}]}$	0	+	+					−6.843	67.723	157.502	182.713
								(207.554)	(54.627)	(251.344)	(83.688)
$\beta_{j[bmi_{-jt}]}$	0	−	−					48.230	17.306	398.095	38.273
								(136.658)	(54.047)	(191.846)	(82.907)
Past shocks $(t-1)$											
$\beta_{j[w_{jt-1}]}$	0	0	−	−13.855	−7.338	−11.014	−5.027	−12.661	−9.340	−1.571	−0.066
				(5.283)	(3.442)	(10.113)	(10.308)	(5.879)	(4.203)	(11.918)	(14.182)
$\beta_{j[w_{-jt-1}]}$	0	0	+	41.039	6.017	29.492	−6.920	37.322	6.343	53.034	−11.632
				(20.351)	(7.115)	(34.603)	(17.087)	(18.308)	(7.533)	(30.794)	(17.621)
$\beta_{j[bmi_{jt-1}]}$	0	0	+					151.809	111.988	−2.861	194.282
								(212.911)	(49.454)	(227.668)	(110.222)
$\beta_{j[bmi_{-jt-1}]}$	0	0	−					−23.782	−35.817	−331.336	28.995
								(112.985)	(69.013)	(138.675)	(85.020)
Older shocks $(t-2)$											
$\beta_{j[w_{jt-2}]}$	0	0	−			−32.734	−9.642			−59.373	−0.287
						(16.698)	(6.756)			(17.763)	(8.113)
$\beta_{j[w_{-jt-2}]}$	0	0	+			2.413	24.651			25.003	20.090
						(28.807)	(15.101)			(32.186)	(15.496)
$\beta_{j[bmi_{jt-2}]}$	0	0	+							−438.549	139.555
										(247.292)	(107.376)
$\beta_{j[bmi_{-jt-2}]}$	0	0	−							−255.689	41.036
										(85.855)	(86.459)

Table E.2 (continued): Commitment test – reduced form results in detail

	FC	NC	LC	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				wage shocks				**wage shocks & BMI**			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
				Male	Female	Male	Female	Male	Female	Male	Female
				$j = 1$	$j = 2$	$j = 1$	$j = 2$	$j = 1$	$j = 2$	$j = 1$	$j = 2$
Initial distribution factors ($t = 0$)											
$\beta_{j[young_j]}$	0	0	−	−27.979	−14.682	−96.849	−47.777	−38.943	−15.304	−119.766	−43.088
				(26.594)	(6.370)	(33.144)	(11.887)	(28.775)	(7.466)	(36.914)	(14.167)
$\beta_{j[young_{-j}]}$	0	0	+	−80.532	10.376	−128.443	20.781	−73.003	10.394	−94.862	12.585
				(30.226)	(4.579)	(40.309)	(10.502)	(30.317)	(5.641)	(37.748)	(13.261)
Other controls											
$b_{j[\Delta y_t]}$				249.999	91.219	320.192	194.679	245.692	97.412	420.911	218.581
				(31.718)	(32.016)	(49.984)	(54.171)	(31.773)	(33.050)	(54.406)	(49.724)
$b_{j[\Delta a_t]}$				−0.830	−4.826	−7.113	−0.043	1.453	−2.228	−32.790	3.814
				(11.702)	(3.405)	(14.279)	(5.407)	(12.168)	(4.586)	(13.843)	(5.756)
$b_{j[y_{t-1}]}$				32.199	2.048	31.380	5.712	32.224	1.357	44.765	4.834
				(7.304)	(2.542)	(8.696)	(6.390)	(6.632)	(2.557)	(8.240)	(5.984)
$b_{j[a_{t-1}]}$				−33.125	−2.524	−30.299	−6.624	−33.097	−2.114	−43.526	−6.151
				(7.355)	(2.247)	(8.510)	(5.641)	(6.458)	(2.264)	(7.732)	(5.422)
$b_{j[\Delta y_{-jt}]}$				−186.365	−85.851	−275.473	−166.261	−171.149	−99.010	−334.212	−198.050
				(40.079)	(29.807)	(65.878)	(44.434)	(37.063)	(32.475)	(63.630)	(40.825)
$b_{j[\Delta q_t]}$				0.001	−0.000	0.001	0.000	0.000	−0.000	0.001	−0.000
				(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
$b_{j[\Delta a_{t-1}]}$				−2.161	−3.105	−4.697	0.297	−1.807	−3.168	−10.136	−0.415
				(3.933)	(1.532)	(5.023)	(2.283)	(4.057)	(1.222)	(4.754)	(2.487)
$b_{j[\Delta a_{t-2}]}$						−3.202	2.003			−2.614	2.846
						(4.008)	(1.964)			(3.870)	(2.632)
p value for $\mathcal{H}_0^{FC}$				0.000	0.000	0.001	0.000	0.012	0.000	0.000	0.000
p value for $\mathcal{H}_0^{NC}$				0.001	0.000	0.001	0.000	0.010	0.001	0.000	0.000
Observations				8,513		6,028		7,616		5,294	

Notes: The table reports the coefficient estimates from the reduced form (first) specification of the commitment test with wages (columns 1-4) and wages and BMI (columns 5-8) as time-varying distribution factors. Standard errors clustered at the household level are in brackets.

Table E.3: Commitment test – structural results in detail

				wage shocks				wage shocks & BMI			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
	FC	NC	LC	(1) Male $j=1$	(2) Female $j=2$	(3) Male $j=1$	(4) Female $j=2$	(5) Male $j=1$	(6) Female $j=2$	(7) Male $j=1$	(8) Female $j=2$
Pareto weight elasticities w.r.t current factors ($\tau=0$)											
$\eta_{j0}^{w_j}$	0	+	+	1.020	1.007	1.004	1.006	1.018	1.007	1.012	1.000
				(0.010)	(0.010)	(0.011)	(0.012)	(0.009)	(0.008)	(0.010)	(0.011)
$\eta_{j0}^{w_{-j}}$	0	−	−	−0.034	−0.003	−0.025	−0.006	−0.036	−0.019	−0.026	−0.013
				(0.022)	(0.012)	(0.017)	(0.018)	(0.023)	(0.016)	(0.015)	(0.018)
$\eta_{j0}^{bmi_j}$	0	−	−					−0.043	−0.059	−0.104	−0.073
								(0.214)	(0.091)	(0.140)	(0.107)
$\eta_{j0}^{bmi_{-j}}$	0	+	+					0.049	−0.016	−0.130	−0.039
								(0.147)	(0.085)	(0.100)	(0.070)
Pareto weight elasticities w.r.t factors 1 period in the past ($\tau=1$)											
$\eta_{j1}^{w_j}$	0	0	+	0.012	0.009	0.010	0.002	0.012	0.011	0.005	0.002
				(0.006)	(0.008)	(0.006)	(0.010)	(0.007)	(0.008)	(0.006)	(0.012)
$\eta_{j1}^{w_{-j}}$	0	0	−	−0.032	0.000	−0.031	0.002	−0.028	−0.000	−0.033	0.001
				(0.022)	(0.019)	(0.020)	(0.015)	(0.018)	(0.017)	(0.015)	(0.014)
$\eta_{j1}^{bmi_j}$	0	0	−					−0.271	−0.174	−0.077	−0.150
								(0.201)	(0.104)	(0.107)	(0.114)
$\eta_{j1}^{bmi_{-j}}$	0	0	+					0.025	0.051	0.159	0.062
								(0.108)	(0.104)	(0.062)	(0.082)
Pareto weight elasticities w.r.t factors 2 periods in the past ($\tau=2$)											
$\eta_{j2}^{w_j}$	0	0	+			0.010	0.009			0.019	0.004
						(0.012)	(0.005)			(0.012)	(0.008)
$\eta_{j2}^{w_{-j}}$	0	0	−			−0.023	−0.026			−0.029	−0.022
						(0.018)	(0.016)			(0.017)	(0.015)
$\eta_{j2}^{bmi_j}$	0	0	−							0.170	−0.084
										(0.115)	(0.124)
$\eta_{j2}^{bmi_{-j}}$	0	0	+							0.095	0.126
										(0.042)	(0.106)

Table E.3 (continued): Commitment test – structural results in detail

	FC	NC	LC	**wage shocks**				**wage shocks & BMI**			
				$\geq$ 3 periods		$\geq$ 4 periods		$\geq$ 3 periods		$\geq$ 4 periods	
				(1) Male $j=1$	(2) Female $j=2$	(3) Male $j=1$	(4) Female $j=2$	(5) Male $j=1$	(6) Female $j=2$	(7) Male $j=1$	(8) Female $j=2$
Pareto weight elasticities w.r.t initial distribution factors											
$\eta_{jt}^{young_j}$	0	0	+	0.046	0.025	0.062	0.038	0.060	0.023	0.064	0.037
				(0.024)	(0.011)	(0.024)	(0.014)	(0.028)	(0.013)	(0.023)	(0.012)
$\eta_{jt}^{young_{-j}}$	0	0	−	0.096	−0.023	0.077	−0.021	0.086	−0.019	0.053	−0.017
				(0.035)	(0.010)	(0.037)	(0.009)	(0.033)	(0.009)	(0.024)	(0.010)
Frisch elasticity α_j/h_{jt-1}[#]				0.545	0.330	1.017	0.720	0.536	0.383	1.270	0.817
				(0.164)	(0.136)	(0.347)	(0.263)	(0.143)	(0.150)	(0.372)	(0.267)
Other terms											
$\ell_{\Delta y}$				0.262	0.190	0.218	0.205	0.264	0.175	0.227	0.196
				(0.044)	(0.018)	(0.029)	(0.013)	(0.041)	(0.019)	(0.025)	(0.014)
$\ell_{\Delta a} - \eta_{j0}^a$				−0.002	−0.012	−0.009	−0.003	0.000	−0.008	−0.017	−0.002
				(0.010)	(0.009)	(0.007)	(0.006)	(0.011)	(0.009)	(0.007)	(0.006)
ℓ_y				0.033	0.007	0.018	0.005	0.031	0.005	0.020	0.005
				(0.010)	(0.007)	(0.006)	(0.008)	(0.008)	(0.006)	(0.006)	(0.007)
ℓ_a				−0.033	−0.008	−0.017	−0.006	−0.032	−0.006	−0.020	−0.006
				(0.010)	(0.006)	(0.006)	(0.007)	(0.008)	(0.005)	(0.006)	(0.006)
ζ_j[##]				−0.006	0.001	−0.006	−0.001	−0.006	0.002	−0.005	0.001
				(0.005)	(0.002)	(0.004)	(0.002)	(0.005)	(0.002)	(0.004)	(0.002)
η_{j1}^a				−0.003	−0.005	−0.005	0.001	−0.002	−0.005	−0.006	0.001
				(0.004)	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)
η_{j2}^a						−0.004	0.003			−0.003	0.002
						(0.002)	(0.002)			(0.002)	(0.002)
p value for $\mathcal{H}_0^{\text{FC}}$				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
p value for $\mathcal{H}_0^{\text{NC}}$				0.025	0.032	0.052	0.050	0.025	0.013	0.027	0.008
Observations				8,513		6,028		7,616		5,294	

Notes: The table reports the parameter estimates from the structural (second) specification of the commitment test with wages (columns 1-4) and wages and BMI (columns 5-8) as time-varying distribution factors. Standard errors clustered at the household level are in brackets. See appendix D for details on the parameters. $\ell_{\Delta y}$, ℓ_y, ℓ_a are common across male and female equations in each specification. For simplicity, we estimate the equations separately without imposing cross-equation restrictions. We cannot reject equality of the parameters across equations in most specifications.
[#]We report the Frisch elasticity at the sample average of hours of work; its standard error is calculated with the delta method.
[##]We multiply ζ_j by 10^4 for legibility (ζ_j originally multiplies the *level* of consumption so its magnitude is very small).

Table E.4: Commitment test – structural results with log-linearized Pareto weight

				wage shocks				**wage shocks & BMI**			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
	FC	NC	LC	(1) Male $j=1$	(2) Female $j=2$	(3) Male $j=1$	(4) Female $j=2$	(5) Male $j=1$	(6) Female $j=2$	(7) Male $j=1$	(8) Female $j=2$
Pareto weight elasticities w.r.t distribution factors											
e_{μ_j,w_j}	0	+	+	1.016	1.007	0.997	0.997	1.012	1.010	0.995	1.003
				(0.010)	(0.009)	(0.004)	(0.006)	(0.007)	(0.010)	(0.004)	(0.005)
$e_{\mu_j,w_{-j}}$	0	−	−	−0.030	−0.003	−0.022	−0.007	−0.026	0.003	−0.024	0.002
				(0.020)	(0.012)	(0.014)	(0.018)	(0.018)	(0.016)	(0.011)	(0.018)
e_{μ_j,bmi_j}	0	−	−					0.017	−0.000	0.027^a	−0.076
								(0.189)	(0.101)	(0.080)	(0.056)
$e_{\mu_j,bmi_{-j}}$	0	+	+					0.093	0.062	-0.212^a	−0.031
								(0.142)	(0.089)	(0.076)	(0.055)
Pareto weight elasticity w.r.t past Pareto weight											
$e_{\mu_j,\mu_{jL}}$	0	0	+	0.015	0.009	0.001	−0.008	0.015	0.015	-0.005^a	−0.001
				(0.007)	(0.008)	(0.002)	(0.006)	(0.007)	(0.010)	(0.003)	(0.007)
Pareto weight elasticities w.r.t initial distribution factors											
$\eta_{jt}^{young_j}$	0	0	+	0.044	0.025	0.057	0.040	0.057	0.030	0.061	0.037
				(0.024)	(0.011)	(0.019)	(0.012)	(0.027)	(0.016)	(0.019)	(0.013)
$\eta_{jt}^{young_{-j}}$	0	0	−	0.088	−0.023	0.058	−0.013	0.102	−0.011	0.072	−0.007
				(0.035)	(0.010)	(0.028)	(0.007)	(0.037)	(0.010)	(0.026)	(0.007)
Frisch elasticity $\alpha_j/h_{jt-1}{}^{\#}$				0.583	0.329	1.239	0.668	0.526	0.319	0.998	0.769
				(0.178)	(0.133)	(0.371)	(0.214)	(0.128)	(0.143)	(0.262)	(0.207)

Table E.4 (continued): Commitment test – structural results with log-linearized Pareto weight

	wage shocks				**wage shocks & BMI**			
	≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
	(1) Male	(2) Female	(3) Male	(4) Female	(5) Male	(6) Female	(7) Male	(8) Female
FC NC LC	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
Other terms								
$\ell_{\Delta y}$	0.253	0.190	0.202	0.193	0.250	0.191	0.211	0.198
	(0.038)	(0.018)	(0.019)	(0.014)	(0.034)	(0.019)	(0.016)	(0.012)
$\ell_{\Delta a} - e_{\mu_j,a}$	0.000	−0.012	−0.007	−0.002	−0.002	−0.016	−0.012	0.002
	(0.010)	(0.009)	(0.007)	(0.005)	(0.011)	(0.012)	(0.007)	(0.005)
ℓ_y	0.030	0.007	0.015	0.005	0.031	0.008	0.012	0.003
	(0.009)	(0.007)	(0.004)	(0.006)	(0.007)	(0.008)	(0.004)	(0.006)
ℓ_a	−0.030	−0.008	−0.014	−0.006	−0.030	−0.008	−0.011	−0.004
	(0.009)	(0.006)	(0.004)	(0.006)	(0.007)	(0.007)	(0.004)	(0.005)
ζ_j ##	−0.008	0.001	−0.009	0.001	−0.008	−0.000	−0.009	0.001
	(0.004)	(0.002)	(0.003)	(0.002)	(0.005)	(0.002)	(0.003)	(0.001)
η^a_{j1}	−0.002	−0.005	−0.005	0.001	−0.001	−0.005	−0.007	−0.000
	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.002)
η^a_{j2}			−0.002	0.004			−0.004	0.003
			(0.002)	(0.002)			(0.002)	(0.002)
p value for $\mathcal{H}_0^{\text{FC}}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
p value for $\mathcal{H}_0^{\text{NC}}$	0.016	0.015	0.007	0.012	0.003	0.015	0.002	0.004
Observations	8,513		6,028		7,616		5,294	

Notes: The table reports the parameter estimates from the structural specification of the commitment test with wages (columns 1-4) and wages and BMI (columns 5-8) as time-varying distribution factors, letting $\Delta \log \mu_{jt}$ take the log-linear form in (8). Standard errors clustered at the household level are in brackets. See appendix D for details on the parameters. We estimate each of $\eta_{jt}^{young_j} = (e_{\mu_j,\mu_{jL}})^t e_{\mu_j,young_j}$ and $\eta_{jt}^{young_{-j}} = (e_{\mu_j,\mu_{jL}})^t e_{\mu_j,young_{-j}}$ as a single parameter because we do not consistently observe the length of marriage t. For comparability across specifications, we also estimate each of $\eta^a_{j1} = e_{\mu_j,\mu_{jL}} e_{\mu_j,a}$ and $\eta^a_{j2} = (e_{\mu_j,\mu_{jL}})^2 e_{\mu_j,a}$ as a single parameter because $e_{\mu_j,a}$, the Pareto weight elasticity with respect to assets, is only identified with four periods or more. $\ell_{\Delta y}$, ℓ_y, ℓ_a are common across male and female equations in each specification. For simplicity, we estimate the equations separately without imposing cross-equation restrictions. We cannot reject equality of the parameters across equations in most specifications.

#We report the Frisch elasticity at the sample average of hours of work; its standard error is calculated with the delta method.

##We multiply ζ_j by 10^4 for legibility (ζ_j originally multiplies the *level* of consumption so its magnitude is very small).

[a] In column 7, we obtain a marginally significant negative $e_{\mu_j,\mu_{jL}}$, which is not consistent with theory. However, the elasticities with respect to BMI have the opposite sign than expected, so the overall partial effect of past BMI is in line with theory (the partial effect is given by $(e_{\mu_j,\mu_{jL}})^\tau e_{\mu_j,bmi_k}$ for $\tau \in \{1,2\}$). We attribute $e_{\mu_j,\mu_{jL}} < 0$ to a local minimum which our optimizer on Stata is unable to overcome.

Table E.5: Commitment test – structural results with heterogeneity

	wage shocks, $\geq$ 4 periods			
	Male $j=1$		Female $j=2$	
	(1) estimate	(2) st.error	(3) estimate	(4) st.error
Pareto weight elasticities w.r.t current factors ($\tau=0$)				
$\eta_{j0}^{w_j}$				
constant	0.999	(0.022)	1.004	(0.022)
w_{jt-1}	−0.040	(0.015)	−0.025	(0.008)
w_{-jt-1}	0.061	(0.026)	0.069	(0.035)
$\mathbb{1}[age_j << age_{-j}]$	0.030	(0.030)	−0.014	(0.026)
$\mathbb{1}[age_j >> age_{-j}]$	0.016	(0.034)	−0.020	(0.015)
$\eta_{j0}^{w_{-j}}$				
constant	0.014	(0.025)	0.017	(0.022)
w_{jt-1}	0.021	(0.023)	0.047	(0.026)
w_{-jt-1}	0.009	(0.013)	−0.079	(0.036)
$\mathbb{1}[age_j << age_{-j}]$	−0.023	(0.038)	0.011	(0.026)
$\mathbb{1}[age_j >> age_{-j}]$	−0.148	(0.058)	0.039	(0.045)
Pareto weight elasticities w.r.t factors 1 period in the past ($\tau=1$)				
$\eta_{j1}^{w_j}$				
constant	−0.029	(0.026)	0.008	(0.015)
w_{jt-2}	0.014	(0.010)	−0.050	(0.028)
w_{-jt-2}	−0.054	(0.066)	0.052	(0.031)
$\mathbb{1}[age_j << age_{-j}]$	0.012	(0.030)	−0.012	(0.027)
$\mathbb{1}[age_j >> age_{-j}]$	0.059	(0.045)	−0.003	(0.024)
$\eta_{j1}^{w_{-j}}$				
constant	−0.058	(0.023)	−0.026	(0.023)
w_{jt-2}	0.005	(0.027)	0.073	(0.065)
w_{-jt-2}	0.056	(0.034)	−0.002	(0.015)
$\mathbb{1}[age_j << age_{-j}]$	0.015	(0.040)	0.012	(0.027)
$\mathbb{1}[age_j >> age_{-j}]$	−0.063	(0.064)	0.046	(0.040)
Pareto weight elasticities w.r.t factors 2 periods in the past ($\tau=2$)				
$\eta_{j2}^{w_j}$				
constant	0.001	(0.022)	0.029	(0.008)
w_{jt-3}	0.013	(0.011)	−0.022	(0.012)
w_{-jt-3}	−0.009	(0.050)	0.005	(0.016)
$\mathbb{1}[age_j << age_{-j}]$	0.011	(0.024)	−0.008	(0.017)
$\mathbb{1}[age_j >> age_{-j}]$	0.018	(0.030)	−0.034	(0.011)
$\eta_{j2}^{w_{-j}}$				
constant	−0.067	(0.036)	−0.042	(0.025)
w_{jt-3}	0.047	(0.034)	−0.047	(0.045)
w_{-jt-3}	−0.027	(0.033)	0.052	(0.045)
$\mathbb{1}[age_j << age_{-j}]$	0.061	(0.040)	0.039	(0.024)
$\mathbb{1}[age_j >> age_{-j}]$	0.032	(0.039)	0.026	(0.025)

Table E.5 (continued): Commitment test – structural results with heterogeneity

	wage shocks, $\geq$ 4 periods			
	Male $j=1$		Female $j=2$	
	(1) estimate	(2) st.error	(3) estimate	(4) st.error
Pareto weight elasticities w.r.t initial distribution factors				
$\eta_{jt}^{young_j}$	0.083	(0.031)	0.020	(0.012)
$\eta_{jt}^{young_{-j}}$	0.080	(0.042)	−0.019	(0.008)
Frisch elasticity α_j/h_{jt-1} [#]	1.053	(0.375)	1.087	(0.270)
Other terms				
$\ell_{\Delta y}$	0.251	(0.042)	0.205	(0.012)
$\ell_{\Delta a} - \eta_{j0}^a$	−0.007	(0.008)	0.000	(0.006)
ℓ_y	0.018	(0.007)	0.006	(0.007)
ℓ_a	−0.017	(0.006)	−0.007	(0.007)
ζ_j [##]	−0.007	(0.003)	0.000	(0.002)
η_{j1}^a	−0.008	(0.004)	−0.003	(0.002)
η_{j2}^a	−0.006	(0.003)	0.001	(0.001)
p value for $\mathcal{H}_0^{\text{FC}}$ [###]	0.042		0.032	
p value for $\mathcal{H}_0^{\text{NC}}$ [###]	0.044		0.085	
Observations	6,028		6,028	

Notes: The table reports the parameter estimates from the heterogeneity (third) specification of the commitment test with wages as time-varying distribution factors. The coefficient on each Pareto weight elasticity depends linearly on the immediately past levels of wages and the age-gap-at-marriage dummies. Standard errors clustered at the household level are in brackets. See appendix D for details on the parameters. $\ell_{\Delta y}$, ℓ_y, ℓ_a are common across male and female equations in each specification. For simplicity, we estimate the equations separately without imposing cross-equation restrictions. We cannot reject equality of the parameters across equations.

[#] We report the Frisch elasticity at the sample average of hours of work; its standard error is calculated with the delta method.

[##] We multiply ζ_j by 10^4 for legibility (ζ_j originally multiplies the *level* of consumption so its magnitude is very small).

[###] We assess the null hypotheses at the sample average of wages for partners of similar age.

Table E.6: Commitment test – reduced form results from model with home production

				wage shocks				**wage shocks & BMI**			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
	FC	NC	LC	(1) Male $j=1$	(2) Female $j=2$	(3) Male $j=1$	(4) Female $j=2$	(5) Male $j=1$	(6) Female $j=2$	(7) Male $j=1$	(8) Female $j=2$
Current shocks (t)											
$\beta_{j[w_{jt}]}$	.	.	.	−25.556	−11.151	−30.780	−12.894	−30.166	−11.762	−62.009	−6.540
				(10.025)	(5.021)	(19.663)	(12.542)	(7.170)	(5.008)	(20.435)	(11.796)
$\beta_{j[w_{-jt}]}$	0	+	+	56.647	−14.455	39.896	−22.827	54.652	−10.952	57.291	−16.835
				(31.409)	(10.708)	(31.649)	(19.290)	(23.814)	(10.690)	(34.134)	(19.702)
$\beta_{j[bmi_{jt}]}$	0	+	+					−67.422	70.901	114.658	197.043
								(244.487)	(58.789)	(245.187)	(84.153)
$\beta_{j[bmi_{-jt}]}$	0	−	−					461.610	11.033	480.797	−57.695
								(171.125)	(66.830)	(190.139)	(103.220)
Past shocks $(t-1)$											
$\beta_{j[w_{jt-1}]}$	0	0	−	−7.420	−2.800	−9.588	−2.917	5.750	−3.572	6.221	−0.213
				(6.936)	(3.642)	(11.362)	(9.693)	(7.922)	(4.404)	(12.666)	(13.724)
$\beta_{j[w_{-jt-1}]}$	0	0	+	31.118	4.641	33.310	−14.549	43.137	6.791	52.388	−20.878
				(21.524)	(12.136)	(35.109)	(18.496)	(18.872)	(11.785)	(32.752)	(18.759)
$\beta_{j[bmi_{jt-1}]}$	0	0	+					165.220	120.676	8.225	201.805
								(217.287)	(54.733)	(233.794)	(111.795)
$\beta_{j[bmi_{-jt-1}]}$	0	0	−					−217.602	22.310	−298.889	12.967
								(106.021)	(61.415)	(146.153)	(94.814)
Older shocks $(t-2)$											
$\beta_{j[w_{jt-2}]}$	0	0	−			−26.650	−6.507			−56.900	4.311
						(16.884)	(7.124)			(18.160)	(8.107)
$\beta_{j[w_{-jt-2}]}$	0	0	+			0.312	14.659			33.919	14.737
						(30.527)	(18.763)			(33.753)	(19.383)
$\beta_{j[bmi_{jt-2}]}$	0	0	+							−506.777	147.855
										(265.056)	(103.282)
$\beta_{j[bmi_{-jt-2}]}$	0	0	−							−244.347	42.601
										(84.398)	(87.118)

Table E.6 (continued): Commitment test – reduced form results from model with home production

	FC	NC	LC	wage shocks				wage shocks & BMI			
				≥ 3 periods		≥ 4 periods		≥ 3 periods		≥ 4 periods	
				(1) Male $j=1$	(2) Female $j=2$	(3) Male $j=1$	(4) Female $j=2$	(5) Male $j=1$	(6) Female $j=2$	(7) Male $j=1$	(8) Female $j=2$
Initial distribution factors ($t=0$)											
$\beta_{j[young_j]}$	0	0	−	−49.723	−28.257	−95.713	−65.280	−59.979	−26.884	−126.633	−60.520
				(32.414)	(9.332)	(37.011)	(14.615)	(33.219)	(10.036)	(39.900)	(17.208)
$\beta_{j[young_{-j}]}$	0	0	+	−64.714	11.750	−120.849	10.608	−44.953	8.851	−97.815	−0.599
				(37.706)	(5.020)	(39.492)	(11.567)	(33.142)	(5.923)	(38.652)	(14.659)
Other controls											
$b_{j[\Delta y_t]}$				310.455	113.349	310.202	192.608	346.956	113.654	429.099	232.624
				(47.269)	(45.884)	(49.269)	(54.191)	(43.985)	(45.848)	(53.485)	(50.342)
$b_{j[\Delta a_t]}$				5.148	−9.303	−2.570	−3.968	4.371	−7.785	−31.144	−0.977
				(12.930)	(4.393)	(15.729)	(6.416)	(12.235)	(4.980)	(15.619)	(7.269)
$b_{j[y_{t-1}]}$				23.436	5.443	33.926	9.472	23.356	1.449	48.149	6.717
				(7.386)	(3.273)	(8.768)	(7.074)	(6.683)	(3.750)	(9.293)	(6.279)
$b_{j[a_{t-1}]}$				−24.877	−5.510	−33.024	−9.322	−25.426	−2.143	−46.811	−7.318
				(7.487)	(2.920)	(8.513)	(6.053)	(6.529)	(3.324)	(8.666)	(5.540)
$b_{j[\Delta y_{-jt}]}$				−300.212	−86.496	−267.815	−161.406	−314.366	−90.443	−340.026	−207.909
				(67.041)	(39.957)	(63.669)	(45.958)	(53.742)	(40.754)	(62.730)	(43.294)
$b_{j[\Delta x_t]}$				0.001	−0.000	0.001	0.000	0.001	−0.000	0.001	0.000
				(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
$b_{j[\Delta d_{jt}]}$				−0.278	0.320	−0.207	0.963	−0.099	0.182	−1.527	0.952
				(0.939)	(0.167)	(1.171)	(0.473)	(0.924)	(0.171)	(1.303)	(0.568)
$b_{j[\Delta d_{-jt}]}$				0.474	0.439	−0.186	−0.341	1.287	0.525	1.419	0.430
				(0.889)	(0.642)	(1.142)	(1.259)	(1.035)	(0.697)	(1.269)	(1.243)
$b_{j[\Delta a_{t-1}]}$				−6.867	−7.169	−5.030	−1.097	−10.158	−5.008	−13.201	0.214
				(3.934)	(2.085)	(5.663)	(3.916)	(4.079)	(2.399)	(5.893)	(4.318)
$b_{j[\Delta a_{t-2}]}$						−3.949	2.850			−3.154	3.805
						(4.074)	(2.286)			(4.030)	(2.932)
p value for $\mathcal{H}_0^{\text{FC}}$				0.028	0.001	0.002	0.000	0.000	0.005	0.000	0.000
p value for $\mathcal{H}_0^{\text{NC}}$				0.055	0.002	0.005	0.000	0.004	0.004	0.000	0.000
Observations				7,673		5,461		6,862		4,785	

Notes: The table reports the coefficient estimates from the reduced form (first) specification of the commitment test with wages (columns 1-4) and wages and BMI (columns 5-8) as time-varying distribution factors. Standard errors clustered at the household level are in brackets.

F Measurement error

In this appendix we discuss the implications of measurement error in hours and wages for our results. Consider the estimating equation for hours, $j \in \{1, 2\}$, given compactly by

$$\Delta \log h_{jt} = \beta_{j[w_{jt}]}\omega_{jt} + \beta_{j[w_{-jt}]}\omega_{-jt} + \beta_{j[w_{jt-1}]}\omega_{jt-1} + \beta_{j[w_{-jt-1}]}\omega_{-jt-1} + \varepsilon_{jt}.$$

This corresponds to equation (11) after some simplifications: we focus on current and immediate past wage shocks (as if older shocks do not exist), we remove all other non-wage terms (as if $\Delta \log h_{jt}$ has first been netted of those terms), we maintain that wage shocks and the error of the equation are mean independent (this would not hold if ε_{jt} subsumed older shocks; we would have to explicitly account for them in such case). None of these choices matter for the discussion below. Let us also consolidate the notation as $\Delta h_{jt} = \Delta \log h_{jt}$, $\beta_1 = \beta_{j[w_{jt}]}$, $\beta_2 = \beta_{j[w_{-jt}]}$, $\beta_3 = \beta_{j[w_{jt-1}]}$, $\beta_4 = \beta_{j[w_{-jt-1}]}$.

The (method of moments) population coefficients are given by

$$\begin{aligned}
\beta_1 &= \big\{V(\omega_{jt-1})C(\Delta h_{jt}, \omega_{jt}) - C(\omega_{jt}, \omega_{jt-1})C(\Delta h_{jt}, \omega_{jt-1})\big\}/D_j \\
\beta_2 &= \big\{V(\omega_{-jt-1})C(\Delta h_{jt}, \omega_{-jt}) - C(\omega_{-jt}, \omega_{-jt-1})C(\Delta h_{jt}, \omega_{-jt-1})\big\}/D_{-j} \\
\beta_3 &= \big\{V(\omega_{jt})C(\Delta h_{jt}, \omega_{jt-1}) - C(\omega_{jt}, \omega_{jt-1})C(\Delta h_{jt}, \omega_{jt})\big\}/D_j \\
\beta_4 &= \big\{V(\omega_{-jt})C(\Delta h_{jt}, \omega_{-jt-1}) - C(\omega_{-jt}, \omega_{-jt-1})C(\Delta h_{jt}, \omega_{-jt})\big\}/D_{-j},
\end{aligned} \tag{F.1}$$

where $V(\cdot)$ and $C(\cdot,\cdot)$ are the variance and covariance, and $D_j = V(\omega_{jt})V(\omega_{jt-1}) - (C(\omega_{jt}, \omega_{jt-1}))^2$ and $D_{-j} = V(\omega_{-jt})V(\omega_{-jt-1}) - (C(\omega_{-jt}, \omega_{-jt-1}))^2$ are the (positive) determinants of the covariance matrices of shocks of spouse j and partner $-j$ respectively.[4]

These expressions assume that shocks do not co-vary across partners, i.e. $C(\omega_{jt}, \omega_{-jt-\tau}) = 0$, $\forall \tau$. This in turn requires that, first, *true* male-female shocks are uncorrelated, and second, measurement errors in male and female wages are uncorrelated. We maintain the first assumption here to keep the expressions simple but we do *not* impose it in the empirical application. We return to the second assumption below.

Suppose observed hours and wages are subject to error. Let $\Delta h^o_{jt} = \Delta h_{jt} + \Delta e^{h_j}_t$, $\omega^o_{jt-\tau} = \omega_{jt-\tau} + \Delta e^{w_j}_{t-\tau}$, and $\omega^o_{-jt-\tau} = \omega_{-jt-\tau} + \Delta e^{w_{-j}}_{t-\tau}$, for $\tau \in \{0, 1\}$; that is, the observed variable is equal to the true variable plus measurement error. We let e^{h_j}, e^{w_j}, $e^{w_{-j}}$ be independent of the value of the true variable and serially uncorrelated (classical assumptions). Given the first difference, however, hours/wages correlate with their past counterparts due to mean reversion in the error. Moreover, if wages are earnings over hours, it follows that $e^{w_j} = e^{y_j} - e^{h_j}$, where

[4]It should be understood that $V(\omega_{jt}) = V(\Delta \log w_{jt})$, $C(\Delta h_{jt}, \omega_{jt}) = C(\Delta \log h_{jt}, \Delta \log w_{jt})$ etc., where $\Delta \log w_{jt}$ is the residual from the regression of wage growth on observable characteristics $\mathbf{x}^w_{jt}$ (section 4.3).

e^{y_j} is the error in spouse j's (log) earnings.[5] Therefore, error in hours and wages correlate negatively. Assuming time-invariance of the second moments of the error, it follows that

- $V(\Delta e_t^{w_j}) = 2\sigma_{e^{w_j}} > 0$ and $C(\Delta e_t^{w_j}, \Delta e_{t-1}^{w_j}) = -\sigma_{e^{w_j}} < 0$
- $C(\Delta e_t^{h_j}, \Delta e_t^{w_j}) = -2\sigma_{e^{h_j}} < 0$ and $C(\Delta e_t^{h_j}, \Delta e_{t-1}^{w_j}) = \sigma_{e^{h_j}} > 0$
- $C(\Delta e_t^{h_j}, \Delta e_{t-\tau}^{w_{-j}}) = 0$, for $\tau = \{0, 1\}$

where $\sigma_{e^{h_j}}$ and $\sigma_{e^{w_j}}$, $j \in \{1, 2\}$, are the *variances* of the error in hours and wages.

With measurement error, the coefficients β_1^o, β_2^o, etc., may differ from the true parameters β_1, β_2, etc. To understand how they may differ, consider first the denominator in (F.1). After some algebra, it is given by $D_j^o = D_j + 3(\sigma_{e^{w_j}})^2 + 2\sigma_{e^{w_j}} \left(V(\omega_{jt}) + V(\omega_{jt-1}) + C(\omega_{jt}, \omega_{jt-1})\right) > D_j > 0$, and similarly for D_{-j}^o.[6] Measurement error thus inflates the positive denominators, which, ceteris paribus, biases all coefficients towards zero. Below we discuss how error biases the numerators in (F.1), starting from β_2 and β_4 that are easier to characterize.

Coefficients on partner wage. The numerator in β_2^o (coefficient on partner's current wage allowing for measurement error) is given by $\text{num}(\beta_2^o) = \text{num}(\beta_2) + \sigma_{e^{w_{-j}}} \left(2C(\Delta h_{jt}, \omega_{-jt}) + C(\Delta h_{jt}, \omega_{-jt-1})\right)$, where $\text{num}(\beta_2)$ is the numerator in β_2 in (F.1).

1. Let $C(\Delta h_{jt}, \omega_{-jt}) > 0$ and $C(\Delta h_{jt}, \omega_{-jt-1}) > 0$. Then $\text{num}(\beta_2)$ is positive, and $\beta_2 > 0$ as we expect in non-full commitment. Then $\text{num}(\beta_2^o) > \text{num}(\beta_2)$; that is, measurement error preserves the sign of the numerator and increases its magnitude. However, the denominator D_{-j} increases by much more[7] so measurement error overall biases the estimate downwards towards zero bargaining effects (full commitment).

2. Let $C(\Delta h_{jt}, \omega_{-jt}) < 0$ and $C(\Delta h_{jt}, \omega_{-jt-1}) < 0$. Then $\text{num}(\beta_2) < 0$ and $\beta_2 < 0$, which is inconsistent with bargaining. The question is then whether measurement error biases β_2^o towards positive values, making it artificially consistent with non-full commitment. Clearly not as $\text{num}(\beta_2^o) < \text{num}(\beta_2)$, so β_2^o remains inconsistent with bargaining.

[5] See Blundell et al. (2016) for details. We use the hourly wage rate variable in the PSID (e.g. variable `ER77414` in 2019), which is calculated as annual earnings over hours, thus is subject to the division bias.

[6] The covariance between consecutive shocks is likely negative (e.g. in the permanent-transitory process for wages, it is negative due to mean reversion of the transitory shock). However, $|C(\omega_{jt}, \omega_{jt-1})|$ is always smaller than the largest standalone variance, so the bracketed term is strictly positive.

[7] To see this, notice that $\sigma_{e^{w_{-j}}} \left(2V(\omega_{-jt}) + V(\omega_{-jt-1})\right)$, which is only part of the increase in the denominator due to the error, is larger than $\sigma_{e^{w_{-j}}} \left(2C(\Delta h_{jt}, \omega_{-jt}) + C(\Delta h_{jt}, \omega_{-jt-1})\right)$ in the numerator if the covariances between hours and partner shocks are smaller than the variances of the shocks themselves. This is generally true since a regression of hours on partner shocks, controlling for income, wealth, and other margins as we do in (11), generally produces coefficients that are much smaller than 1 in absolute value.

3. Let $C(\Delta h_{jt}, \omega_{-jt}) > 0$ and $C(\Delta h_{jt}, \omega_{-jt-1}) < 0$. (a) Let $\beta_2 > 0$. Then $\text{num}(\beta_2^o) > \text{num}(\beta_2)$ as in case 1, since $|C(\Delta h_{jt}, \omega_{-jt})|$ is typically larger than $|C(\Delta h_{jt}, \omega_{-jt-1})|$; the denominator increases by more than the numerator and β_2^o is biased towards zero. (b) Let $\beta_2 < 0$. Measurement error likely biases the numerator upwards towards zero. Its sign flips from negative to positive if $|C(\Delta h_{jt}, \omega_{-jt})| >> |C(\Delta h_{jt}, \omega_{-jt-1})|$, which biases β_2^o towards no/limited commitment, but this is unlikely because β_2 would itself be positive in such case (a contradiction).

4. Let $C(\Delta h_{jt}, \omega_{-jt}) < 0$ and $C(\Delta h_{jt}, \omega_{-jt-1}) > 0$. (a) Let $\beta_2 > 0$. Measurement error likely biases the numerator downwards towards zero. It may flip its sign to negative, making β_2^o inconsistent with bargaining. (b) Let $\beta_2 < 0$. Measurement error makes the numerator more negative and β_2^o is again inconsistent with bargaining.

An analogous discussion applies to β_4^o, the coefficient on the partner's past shock.[8]

Coefficients on own wage. The numerator in β_1^o (coefficient on own current wage allowing for error) is given by $\text{num}(\beta_1^o) = \text{num}(\beta_1) + \sigma_{e^{w_j}}(2C(\Delta h_{jt}, \omega_{jt}) + C(\Delta h_{jt}, \omega_{jt-1})) - \sigma_{e^{h_j}}(2V(\omega_{jt-1}) + C(\omega_{jt}, \omega_{jt-1})) - 3\sigma_{e^{w_j}}\sigma_{e^{h_j}}$, where $\text{num}(\beta_1)$ is the numerator in β_1 in (F.1).

1. $C(\Delta h_{jt}, \omega_{jt}) > 0$ and $C(\Delta h_{jt}, \omega_{jt-1}) > 0$. Then $\text{num}(\beta_1^o)$ is biased downwards and even flips its sign to negative if the variance of error is large. In that case, β_1 is downwards biased or even negative, as we often find in the empirical application. This is caused by the negative correlation between errors in concurrent hours and wages.

2. $C(\Delta h_{jt}, \omega_{jt}) < 0$ and $C(\Delta h_{jt}, \omega_{jt-1}) < 0$. This contradicts intuition since it implies a negative substitution effect of wages. Measurement error then results in $\text{num}(\beta_1^o) < \text{num}(\beta_1) < 0$, and β_1^o remains negative.

3. $C(\Delta h_{jt}, \omega_{jt}) > 0$ and $C(\Delta h_{jt}, \omega_{jt-1}) < 0$. Error may increase or decrease $\text{num}(\beta_1^o)$ relative to $\text{num}(\beta_1)$, so it has an ambiguous effect. However, the denominator D_j most likely increases by more in absolute magnitude, thus driving β_1^o towards zero.

4. $C(\Delta h_{jt}, \omega_{jt}) < 0$ and $C(\Delta h_{jt}, \omega_{jt-1}) > 0$. This contradicts intuition as it likely implies a negative substitution effect of wages (this is true if $|C(\Delta h_{jt}, \omega_{jt})| > |C(\Delta h_{jt}, \omega_{jt-1})|$ as one would expect). Error likely decreases $\text{num}(\beta_1^o)$ relative to $\text{num}(\beta_1)$ (if negative, they make it more negative), though the denominator D_j likely increases by more in magnitude, driving β_1^o towards zero. The overall effect is again ambiguous.

[8] The statement in case 3(b) above applies to the analogous case 4(b) in the discussion of β_4^o. If true $\beta_4 < 0$, then measurement error could flip sign. This requires that $|C(\Delta h_{jt}, \omega_{-jt})| << |C(\Delta h_{jt}, \omega_{-jt-1})|$, which would make β_4 positive in the first place (a contradiction).

An analogous discussion applies to β_3^o, the coefficient on one's own past shock. However, any error-induced downwards bias on β_3^o (i.e. bias towards limited commitment) is likely smaller than the downwards bias in β_1^o, because the covariance between concurrent hours and wages, thus also the negative correlation between errors in concurrent hours and wages, $C(\Delta e_t^{h_j}, \Delta e_t^{w_j})$, receive less weight in this case.

Summary. When the effects of the partner's wages on hours are consistent with bargaining (positive), measurement error biases such effects downwards towards zero (as in full commitment). When these effects are *not* consistent with bargaining (negative), measurement error biases such effects downwards towards larger negative values. So measurement error biases the partner's wage effects *away* from limited commitment. Despite this, the partner's wage effects we document in tables 1, 2, etc., remain strongly consistent with limited commitment.

Measurement error also biases the own wage effects on hours downwards; hence it biases the effect of own past wages *towards* limited commitment. The bias operates mostly through a negative correlation between wage and hours error due to wages being constructed as earnings over hours. The bias is stronger in the coefficient on own current wage, which may explain the large values for $\eta_{j0}^{w_j}$ that we find throughout the paper.

To conclude, with measurement error in wages and hours, the test for commitment should rely on the coefficients on the *partner's* wage shocks. Any evidence for limited commitment in those parameters is not the byproduct of measurement error (though, by contrast, any lack of evidence could be the result of measurement error).

The characterization of measurement error assumes that errors in male and female wages are uncorrelated. It is easy to show that the characterization extends also to the case when errors are positively correlated but not when they are negatively correlated. Negative correlation is unlikely to occur given that wage shocks typically correlate positively between spouses in the PSID (e.g. Blundell et al., 2016).