I Z A Institute of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13545

Intrahousehold Commitment and Intertemporal Labor Supply

Pierre Andre Chiappori
Jose Ignacio Gimenez-Nadal
Jose Alberto Molina
Alexandros Theloudis
Jorge Velilla

JULY 2020

I Z A Institute of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13545

Intrahousehold Commitment and Intertemporal Labor Supply

Pierre Andre Chiappori
Columbia University

Jose Ignacio Gimenez-Nadal
University of Zaragoza

Jose Alberto Molina
University of Zaragoza and IZA

Alexandros Theloudis
LISER

Jorge Velilla
University of Zaragoza

JULY 2020

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Intrahousehold Commitment and Intertemporal Labor Supply*

This paper studies household labor supply, within the context of an intertemporal collective model, and three prominent intrahousehold commitment regimes: full commitment, no commitment, and limited commitment. We propose a test that distinguishes among all three alternatives based on how contemporary and historical changes to the economic environment affect household behavior. We implement the test on recent data from the Panel Study of Income Dynamics in the US (1999-2017). Although couples and singles behave similarly in many aspects, couples' labor supply exhibits distinctive features that are consistent with limited commitment. We then use our results to highlight several issues and caveats that arise when testing for commitment.

JEL Classification: D15, J22

Keywords: intertemporal collective model, household labor supply, commitment, PSID

Corresponding author:
Jose Alberto Molina
Department of Economic Analysis
University of Zaragoza
C/ Gran Vía 2
50005 Zaragoza
Spain
E-mail: jamolina@unizar.es

* This paper was partially written while Molina was visiting the Department of Economics of Boston College, and Velilla was visiting the Department of Economics of Columbia University, to which they are thankful for the hospitality and facilities provided. We thank participants at CEMFI, 2018 BIFI (Zaragoza), 2018 SEHO (Paris), 2018 ESPE (Antwerp), 2018 EEA-ESEM (Cologne) and 2018 EALE (Lyon) for their valuable comments and suggestions. Financial support from the Government of Aragón (Project S32 20R) and Programa Operativo FSE 2014-2020 is gratefully acknowledged.

1 Introduction

The extent to which individuals commit to their partner for life has important implications. On one hand, large amounts of commitment are necessary for sharing risk, producing home goods efficiently, or investing in common assets. On the other hand, limits to commitment prevent spouses from economically exploiting each other and ultimately offer a way out from a bad marriage.

This paper explores intrahousehold commitment in a collective environment (Chiappori, 1988, 1992). We develop a simple intertemporal model of household labor supply through which we discuss three prominent cases of commitment: full commitment, no commitment, and limited commitment. We characterize the dynamics of household labor supply in each case and we propose a test that separates the three alternatives; the test relies on how contemporaneous and past news affect household behavior. We carry out the test on data from the Panel Study of Income Dynamics (PSID) in the US. Couples and singles behave similarly in many aspects; however, couples' labor supply exhibits distinctive features that are consistent with limited commitment. The results allow us to highlight a number of issues that arise when testing for commitment; our insights apply to studies of intertemporal household behavior as well as to more general settings of risk sharing.

1.1 Unitary versus collective models of household labor supply

Traditionally, household studies have followed the so-called unitary model that takes the family as a single decision unit whose preferences are represented by a single, well-behaved utility function. This unitary approach has, over the last decades, come under heavy criticism. The assumption of a unique family utility is an ad-hoc construct with little or no theoretical justification.[1] From a normative perspective, it disregards issues regarding the allocation of power within the household, and tends to generate biased estimates of intrahousehold inequality.[2] Last but not least, its empirical predictions, in particular 'income pooling' (whereby only total household income matters for household behavior, irrespective of individual members' respective contributions), are typically rejected (e.g. Thomas, 1990; Lundberg et al., 1997; Duflo, 2003; Ward-Batts, 2008).

Several models of household behavior, which appeared in the literature in the 1980s, have tried to diverge from the unitary assumption by explicitly recognizing that individual preferences may differ, and by trying to model the decision process through which these preferences interact.[3] Chiappori (1988, 1992) proposed a general framework for analyzing intrahousehold behavior, the collective model, in which individuals are only assumed to reach Pareto-efficient outcomes. Since

[1]This is exactly Becker's criticism of family welfare indices introduced by Samuelson (see Becker, 1991). Becker's 'Rotten Kid' theorem, on the other hand, provides such a justification, but relies on strong and unrealistic assumptions (see Bergstrom, 1989).

[2]See for instance the discussion on equivalence versus indifference scales in Browning et al. (2013), Dunbar et al. (2013), and Chiappori (2016).

[3]See for instance Manser and Brown (1980); Ashworth and Ulph (1981); McElroy and Horney (1981); Apps (1981, 1982); Bourguignon (1984); Apps and Jones (1986); Ulph (1988); and Woolley (1988).

then, several studies have proposed various extensions to the collective model. For instance, Bourguignon et al. (1993) developed a model with caring preferences, Chiappori (1997) introduced household production, Browning and Chiappori (1998) provided general identification results introducing the concept of distribution factors, Blundell et al. (2005) developed a model of labor supply with public consumption, and Chiappori and Ekeland (2006, 2009) and Bourguignon et al. (2009) provided general results for identification and characterization. Several studies have pointed to the empirical validity of the collective model.[4]

1.2 Intertemporal issues in the collective framework

The collective models developed in the 1990s and 2000s were however mostly static, which has strong limitations. They cannot be used for evaluating policies entailing an intertemporal aspect as they ignore the dynamics of intrahousehold processes (Mazzocco, 2007; Chiappori and Mazzocco, 2017). Conversely, most of the recent theoretical and empirical literature on household intertemporal decisions has remained in the unitary field (e.g. Scholz et al., 2006; Krueger and Perri, 2006; Heathcote et al., 2014). A basic reason for this limitation is the sheer complexity of the issues raised by intertemporal behavior in a collective model.

Commitment is an obvious and particularly important example of these difficulties. Any model involving a dynamic decision process must rely on specific assumptions regarding agents' ability to commit to their future behavior. Clearly, behavioral predictions in a dynamic setting will crucially depend on the assumptions made; as a result, the relevance of any policy recommendation will vary with them. To take but one example, an analysis of the long term impact of legislations governing divorce cannot ignore the limitations (if any) introduced by the spouse's ability to commit.

Three models of intertemporal behavior have emerged in the collective environment to fill this gap: the full intertemporal commitment (FIC) model, the no intertemporal commitment (NIC) model, and the limited intertemporal commitment (LIC) model. In FIC, household members are able, at the beginning of the relationship, to fully commit to *all* future (and state-contingent) allocations of resources between them. In each period and state of the world, household decisions maximize a weighted sum of individual utilities (i.e. ex post efficiency); FIC imposes furthermore that the corresponding Pareto weights are fully determined at the beginning of the marital relationship and *cannot be affected by future shocks of any type.* So FIC models typically generate ex ante efficient allocations involving full risk sharing among household members. The price to pay for these strong normative properties is in term of realism. FIC postulates that exogenous shocks cannot possibly impact the allocation of power within the household. In particular, individual rationality constraints may in principle be violated. For instance, it might be the case that an

[4]See for instance Browning et al. (1994); Haddad and Hoddinott (1994); Lundberg et al. (1997); Browning and Chiappori (1998); Chiappori et al. (2002); Duflo (2003); Rapoport et al. (2011); Attanasio and Lechene (2014); Lyssiotou (2017); and Armand et al. (2020). Donni and Chiappori (2011) and Donni and Molina (2018) provide reviews of the literature.

agent remains married despite the fact that his/her welfare would be higher if divorced. How such amounts of commitment could be implemented in practice is unclear.

The opposite scenario is that of NIC; here the spouses renegotiate the Pareto weights in every period regardless of past exogenous variables, bargaining powers, or household decisions. These models thus consist of a series of unrelated forward-looking models that only assume *static* Pareto efficiency in each period (ex post efficiency). The main limitation is their *dynamic* (ex ante) inefficiency. In NIC, agents' decisions only depend on current and future values of the relevant variables, but not past values. This severely hampers the agents' ability to share risk and, generally, to efficiently allocate resources across periods and states of the world. To give just one example, efficient risk sharing requires that an agent hit by a negative productivity shock be partially compensated by other family members, especially if that agent had previously compensated others similarly; in NIC, however, the main impact of the shock is often a decrease in the agent's outside option, therefore in his/her bargaining position, thus resulting in lower welfare.

The LIC model provides an elegant bridge between the two polar cases above.[5] In LIC spouses have an outside option that they cannot legally commit not to use; this is typically (but not exclusively) associated with divorce and household dissolution. As a result, individual rationality (IR) constraints must be satisfied. If, following exogenous changes in the economic environment, a continuation of a previous agreement would imply the IR constraint of a spouse to be violated, then a renegotiation takes place with two possible outcomes. If no reallocation of intrahousehold power can satisfy *both* spouses' IR constraints, then separation occurs. Otherwise, intrahousehold power is modified in such a way so that the initially violated IR constraint becomes exactly binding. The appealing property of LIC is that the contract involved is ex ante second best optimal; i.e. it implements an allocation that is ex ante efficient under IR constraints, as established by an abundant literature.[6] Another property of LIC, one which we exploit subsequently, is that the reallocation of power depends on the history of the household, namely on binding past IR constraints reflected on *past* intrahousehold power.

1.3 Testing for commitment

Few only papers have attempted to test for commitment in the context of the collective model; and these contributions have exclusively tested full commitment on one hand, against limited or no commitment on the other hand. Mazzocco (2007) was the first to test FIC against its non-full commitment alternatives. Using consumption data for the United States, he rejects full commitment and the unitary model that is nested within FIC. Lise and Yamada (2018), using a similar strategy, proposed a functional form for intrahousehold power in terms of initial (with respect to marriage) and contemporary variables. Using the Japanese Panel Survey of Consumers,

[5]Mazzocco (2007) introduces the LIC model adapting Ligon et al.'s (2002) inter-household risk sharing model to an intra-household context.

[6]See for instance Kocherlakota (1996) and Ligon et al. (2002).

they find that bargaining power is not exclusively determined by the household's initial situation, thus rejecting FIC. Neither paper distinguishes between NIC and LIC. Other examples are Voena (2015) and Blau and Goodstein (2016).

In principle, testing for full commitment is straightforward: one needs to check whether behavior is compatible with constant, i.e. time- and state-invariant, Pareto weights – a task facilitated by the fact that the Pareto weights can, in general, be identified in each period from labor supply or consumption behavior.[7] Testing for limited versus no commitment is more difficult and there is no test to date that carries out this task. Pareto weights in both cases may vary in response to contemporaneous shocks and the difference between the two alternatives relates to the specific manner the variations may take place. For instance, the Pareto weights in LIC follow a Markov process (Ligon et al., 2002; Voena, 2015); a possible approach could thus test for this Markovian feature. However, this requires an explicit structural model of household behavior, implying that any test is a joint test for commitment *and* the particular specification used for that purpose.

1.4 This paper

This paper proposes and implements a reduced-form test that distinguishes among all three alternative commitment regimes. Our test retains Mazzocco's (2007) spirit regarding the role of contemporaneous information: contemporaneous information serves as a distribution factor that enters intrahousehold bargaining power in NIC and LIC, but not FIC. We extend this to permit a role for *historical* information. As we show in a simple model subsequently, historical information matters for LIC, but not NIC or FIC. In addition, we show that FIC (for which neither contemporaneous nor historical information matter) is nested within NIC (for which historical information does not matter), which in turn is nested within LIC. Nesting and the fact that contemporaneous and/or historical information are excluded from certain alternatives allow us to devise a test that can be implemented in a reduced-form way, i.e. outside a structural model.

The approach we adopt relies on the following intuition.[8] Consider a couple hit, after marriage, by some random productivity shocks. Under FIC, the shocks, whether past or current, will not impact the spouses' respective Pareto weights. While *current* shocks will typically affect household behavior (and particularly labor supply) because ex post efficiency requires the opportunities created by the shocks to be exploited, those effects must remain compatible with ex ante efficiency and Pareto weights will thus not change. Under NIC, *current* shocks do affect the Pareto weights because the agents renegotiate them systematically. In both FIC and NIC, however, *past* shocks are bygones and should be forgotten in current decision making at least to the extent that they do not affect current or future opportunities (e.g. current or future wages).

Under LIC, *current* shocks may affect agents' outside options making an IR constraint harder

[7]See for instance Browning et al. (2014).

[8]Our intuition also relates to Dubois et al. (2008) and Lise and Yamada (2018).

to satisfy. A large unexpected shock *may* result in a violation of an IR constraint necessitating a change in the Pareto weight. This however depends on the last value of the Pareto weight, which has been determined recursively by binding past IR constraints. A change in the Pareto weight following an IR violation is semi-permanent: the new Pareto weight remains untouched until some IR constraint is again violated in the future, an event that itself depends on the last new value of the Pareto weight. These dynamics introduce a memory in household behavior, whereby *past* shocks that affected past IR constraints and Pareto weights matter for future behavior.

Given these insights, we investigate whether and how current and past wage shocks affect individual labor supply in the household. We focus on labor supply because, as we show in a simple model subsequently, theory restricts the sign of the *bargaining* effect of wage shocks (i.e. the effect through shifts in the Pareto weight).[9] For example, LIC requires that positive past shocks affect *own* labor supply negatively through an income effect (reflecting an improvement in one's intrahousehold bargaining power) and *the partner's* labor supply positively (reflecting the opposite). This effect is different from a standard income effect at the household level (which affects both spouses' labor supply similarly) or substitution effect (which affects own labor supply only).[10] Therefore, our test is about the presence of an effect from current and past shocks (particularly 'cross-effects', whereby a shock affecting an individual's wage impacts the partner's future labor supply), and more specifically about the sign of such effect.[11] We argue, in particular, that the signs predicted by the LIC model are unlikely to be observed under alternative explanations.

We employ a quasi-reduced-form specification for our test that relies on Mazzocco's (2007) log-linearization of the Euler equation. While Mazzocco (2007) allows current income shocks to serve as distribution factors,[12] we also introduce various past wage shocks enabling them to have a distinct effect on labor supply. Our specification allows us to flexibly estimate own- and cross-effects of current and past shocks; it also allows us to address several possibly confounding issues at the nexus of wages and family labor supply such as leisure complementarities, consumption nonseparabilities, etc. Naturally, structural estimation of the model would directly address such

[9] The link between individual bargaining power (as summarized by the Pareto weight) and labor supply has been repeatedly established in the literature. For instance, Chiappori et al. (2002) show that the sex ratio in the marriage market and laws governing divorce influence individual labor supply in a way consistent with the collective model. Voena (2015) shows that the switch from mutual consent to unilateral divorce in the US shifts the intrahousehold allocation of power, improving the bargaining position of the less wealthy spouse (usually the female) and resulting in significant changes in their labor supply.

[10] A substitution effect will typically operate positively on own labor supply and leave the partner's labor supply unaffected. However, with leisure complementarities between spouses, the wage shock can also affect the partner's labor supply in the same direction with own labor supply (e.g. Blundell et al., 2016).

[11] Our test applies to other household outcomes, e.g. household public consumption or chores. However, the sign of the effect on such outcomes is not a priori clear as it depends on individual preferences for public consumption or on the technology of home production (e.g. the substitutability of time inputs in home production). The PSID includes information on consumption at the household level but this is not assignable to individual members.

[12] Traditionally, distribution factors are exogenous variables that affect bargaining power but not preferences or the budget set conditional on total income (e.g. Bourguignon et al., 2009). Empirically most such factors considered in the literature are spouses' non-labor incomes (e.g. Thomas, 1990; Lundberg et al., 1997; Cherchye et al., 2012; Attanasio and Lechene, 2014). Wage shocks do not strictly meet this definition as they affect the budget set.

issues; however, it would do so at the cost of a specific parameterization. An advantage of our test is that, although it pertains to unobserved events such as shifts in intrahousehold bargaining power, it can be implemented fairly simply outside a structural framework.

We carry out our test on data from the PSID in survey years 1999 to 2017. Our main outcome of interest is how current and, depending on the specification, shocks up to two periods in the past affect spousal labor supply. We highlight three main findings.

First, we test for full commitment against its two alternatives in the spirit of Mazzocco (2007).[13] Current shocks induce variation in hours in a way that is *potentially* consistent with *intertemporal* variation in bargaining power. While this has been viewed previously as evidence against FIC, we explain that this variation subsumes a bargaining *and* a substitution effect on labor supply. The two effects have opposite signs, we identify their aggregate, and the substitution effect dominates. This does not allow us to reject FIC in favor of NIC or LIC. However, it highlights an advantage of our use of labor supply (or of assignable outcomes more generally). Labor supply restricts the sign of the bargaining effect in a way that household-level consumption does not. While a test for commitment could erroneously reject FIC in favor of NIC or LIC on the basis of current shocks affecting the dynamics of consumption (and irrespective of the presence of substitution effects there too), here any true bargaining effect must also be of the correct sign.

Second, we introduce wage shocks of up to two periods in the past. Past shocks allow us to distinguish between NIC and LIC. Immediately past shocks affect labor supply in a way consistent with LIC: they reduce one's own labor supply and increase that of their partner. The effects we estimate operate on both men and women and are net of income and wealth effects, mean reversion in labor supply, and other possibly confounding factors that we detail subsequently. The effects are consistent with a 'power shift' story where favorable past shocks improve intrahousehold bargaining power of the spouse that receives them, resulting in an increase in his/her leisure. Changes in past bargaining power are semi-permanent in LIC, thus they induce lasting effects on household behavior. Older shocks induce similar effects, although at a smaller magnitude.

Third, while the impact of past shocks on current labor supply is predicted by the LIC version of the collective model, it may also admit alternative explanations. In particular, it may reflect our inability to fully capture the actual dynamics of individual labor supply. We very carefully investigate this issue in the paper. Unlike previous tests for commitment (e.g. Mazzocco, 2007; Lise and Yamada, 2018), we carry out our test on *single men* and *single women* in a similar way we do for couples. We do find an interesting result, namely that current and immediately past shocks do affect singles' labor supply. However, these effects remain different from what is observed for couples. In particular, the impact of older shocks (i.e. from period $t-2$) are quantitatively small and statistically not significant.

That immediately past shocks could be found to influence singles' labor supply is not necessarily

[13] Mazzocco (2007) builds a synthetic consumption panel using the Consumer Expenditure Survey in 1982-1995. We test for full commitment using household labor supply panel data from the PSID in survey years 1999-2017.

surprising. For any individual, current labor supply depends not only on current wages, but also on the person's expectations about future wages; identifying the impact of past shocks on future expectations is obviously a challenging exercise. Notably, wage shocks are not directly observed in the PSID (as well as in most household surveys). One must thus estimate an earnings process through which one backs out the spousal wage shocks in each period. While our test addresses several possible sources of confounding dynamics, such as mean reversion in hours (which implies a mechanical effect from past shocks), wealth effects, and others, it is possible that the true wage dynamics are more complicated than we can account for, inducing spurious correlation between past shocks and current labor supply.[14]

In the regressions on singles, however, these effects, whatever their exact nature, appear to be caused by immediately past shocks only; older shocks do not impact the labor supply behavior of singles. This strongly suggests that, while our estimates may fail to fully capture the dynamics of individual earnings, the resulting biases are unlikely to fully explain the results obtained from the analysis of couples. On the contrary, LIC explicitly predicts an impact of older shocks on current labor supplies, one that operates through the memory properties of the process that determines the Pareto weight.

In addition, we carefully discuss the mechanisms through which such misidentified dynamic effects may operate within couples, and especially the impact they would have on the *partner's* labor supply. We conclude that this impact would be the opposite of what we observe. Intuitively, any uncaptured dynamics that increase (reduce) a person's future earnings would typically translate into a reduction (increase) in *both spouses'* labor supply. The asymmetric impact that we observe, whereby one labor supply is augmented while the other is lessened, seems typical of the LIC model. Again, this finding suggests that (i) couples do behave differently from singles, and (ii) the differences fit the predictions of the LIC model.

The rest of the paper is organized as follows. Section 2 develops the intertemporal model of household labor supply, shows nesting of the commitment alternatives, and characterizes the dynamics of hours. Section 3 presents the empirical specification of our test while Section 4 describes its empirical implementation. Section 5 presents the results and Section 6 concludes.

2 Theory

A household consists of two spouses subscripted by $j = \{1, 2\}$. Each spouse enjoys utility from private leisure l_j and some private Hicksian composite consumption good q_j; we disregard public goods and home production for now although they could both be introduced at little cost. The spouses maximize lifetime utility over periods $t = \{1, \ldots, T\}$; in the various versions of the model,

[14] This limitation is not specific to wages alone; any stochastic variable used as distribution factor can be subject to it. Therefore, tests for commitment must first account confidently for the dynamics in the distribution factors they employ; and ideally they must do so independently from the test itself.

they solve a recursive equation of the form (following Marcet and Marimon, 2019):

$$
\begin{aligned}
V_t\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu_t, A_t\right) = \max_{\{q_{jt}, l_{jt}, A_{t+1}\}_t^j} & u_1(q_{1t}, l_{1t}) + \mu_t u_2(q_{2t}, l_{2t}) \\
& + \beta \ \mathbb{E}_t V_{t+1}\left(\mathbf{\Theta}_0, w_{1t+1}, w_{2t+1}, \mu_{t+1}, A_{t+1}\right),
\end{aligned}
\tag{1}
$$

subject to the sequential budget constraint:

$$
A_t + \sum_{j=1}^{2} w_{jt} = \sum_{j=1}^{2} w_{jt} l_{jt} + \sum_{j=1}^{2} p_t q_{jt} + \frac{A_{t+1}}{1+r}, \qquad t = 1, \ldots, T. \tag{2}
$$

Here, u_j is spouse j's period utility, μ_t the Pareto weight of the second spouse, β the spouses' common discount factor, $\mathbf{\Theta}_0$ includes time-invariant state variables and distribution factors (such as spouses' levels of education), w_{jt} is j's hourly wage in the labor market, and A_t is common assets. As there is a single consumption good, we normalize its price p_t to 1. Total time available for each individual is also normalized to 1.

Hourly wages take the general form $w_{jt+1} = H_j(w_{1t}, w_{2t})$, where, assuming age effects away, spouse j's wage at time $t+1$ depends flexibly on household wages at t. This form is consistent with recent developments in the income dynamics literature (e.g. Arellano et al., 2017).[15] Wages are the only source of uncertainty in the problem so the expectation $\mathbb{E}_t$ is taken over all possible future wages w_{1t+1} and w_{2t+1}, given w_{1t} and w_{2t}. The Markovian property of wages is an identifying assumption for commitment, a point to which we will return shortly. Past wages (w_{1t-1}, w_{2t-1}) may influence the household program at t through three possible channels: the following period's wages (w_{1t}, w_{2t}), assets A_t, and the Pareto weight μ_t. The Pareto weight may change with time in a way that is disciplined by the alternative commitment regimes as we describe below.

For a given process of the Pareto weight $\{\mu_t\}_{t=1,\ldots,T}$, solving (1) subject to (2) generates a sequence of individual labor supplies, private consumption, and future assets. One can therefore, in each period t, compute the *individual* value for each spouse j in the household; we denote this by $V_{jt}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu_t, A_t\right)$.[16]

The problem *may* be subject to two participation constraints in the household, one per spouse. For all $t \geq 1$, the constraints take the form:

$$
V_{1t}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu_t, A_t\right) \geq \widetilde{V}_{1t}\left(\mathbf{\Theta}_0, w_{1t}, A_t\right), \tag{3}
$$

$$
V_{2t}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu_t, A_t\right) \geq \widetilde{V}_{2t}\left(\mathbf{\Theta}_0, w_{2t}, A_t\right). \tag{4}
$$

The left hand side is each spouse's individual value from inside their joint household; $\widetilde{V}_{jt}\left(\mathbf{\Theta}_0, w_{jt}, A_t\right)$

[15] State variables $\mathbf{\Theta}_0$ may enter H_j; we omit this here for simplicity of the notation.

[16] The household value function V_t and individual value function V_{jt} will typically also depend on other, perhaps stochastic, state variables such as the presence of children, etc. While we account for them in our empirical analysis, we are not showing these variables here in order to ease the notation.

is the value of j's outside option (for example, divorce). Household savings may influence individual outside options; for instance, in the case of divorce, marital assets will be divided between spouses, and the impact on individual outside options depends among other things on the marriage contract and/or the laws governing divorce (for example, see Chiappori et al., 2002; Voena, 2015). For the same reason, an agent's outside option may in principle depend on the partner's wage (i.e. $\widetilde{V}_{jt}$ may depend on w_{it}, $i \neq j$). We omit this possibility for the sake of brevity but it would not affect our main conclusions. Note that $\widetilde{V}_{jt}$ depends on past wages only to the extend that past wages affect assets or the distribution of current wages; conditional on assets and current wages, the agents' outside options are history-independent.[17]

2.1 Commitment and the dynamics of the Pareto weight

The alternative commitment regimes discipline how the Pareto weight changes over time. We successively consider the three prominent cases of commitment.

Full intertemporal commitment. With full commitment the spouses commit to any future allocation of resources. Shocks to wages do not change the Pareto weight, which takes the form

$$\mu_t = \mu\left(\mathbf{\Theta}_0\right), \quad \forall t.$$

Variables $\mathbf{\Theta}_0$ are distribution factors known at the time of marriage (e.g. spouses' levels of education) and determine the spouses' initial bargaining powers, thus the Pareto weight, at marriage. Full commitment describes an environment where participation constraints do not exist or never bind. In this case, first best *ex ante* efficiency requires that the Pareto weight μ, once determined at marriage as function of $\mathbf{\Theta}_0$, remains constant for all periods and states of the world (Browning et al., 2014). The household value function has the form $V_t^{\mathrm{FIC}}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu(\mathbf{\Theta}_0), A_t\right)$ and depends on past wages only through past wages' impact on w_{1t} and w_{2t}, and on assets. As the Pareto weight is just a constant that depends on $\mathbf{\Theta}_0$ (and $\mathbf{\Theta}_0$ is in the state space), μ itself does not explicitly enter the state space.

No intertemporal commitment. Without commitment the spouses do not commit to any future allocation of resources. Any new information shifts the household decision process; as a result, and depending on the form of the bargaining game played within the household (on which no assumption is made beyond *ex post* efficiency), the Pareto weight is some function

$$\mu_t = \mu\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, A_t\right), \quad \forall t,$$

[17]Behavior, and in particular the outside options, may also depend on distribution factors (e.g. the sex ratio in the local marriage market; Chiappori et al., 2002; Campaña et al., 2018). In our empirical analysis we do not consider time-varying distribution factors other than wage shocks (also see footnote 12).

which summarizes the exact game played at date t (as in Lise and Yamada, 2018). Start-of-marriage distribution factors $\mathbf{\Theta}_0$ may matter for the decision process; for example, $\mathbf{\Theta}_0$ may influence the form of the bargaining game the spouses play throughout their life. Yet the household problem is a series of history-independent interactions in the sense that, conditional on current wages and assets, any renegotiation of the decision process does not depend on past negotiations. The corresponding household value function is $V_t^{\text{NIC}}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, A_t\right), A_t\right)$; this depends on past wages again only through past wages' impact on w_{1t} and w_{2t}, and on assets. The Pareto weight, though not a constant any more, does not explicitly enter the state space as the variables that it depends on enter the state space directly.

Limited intertemporal commitment. With limited commitment the spouses commit to future allocations of resources up to the point where one's participation constraint is violated. The violation typically occurs because a shock affecting individual wages improves a household member's outside option substantially. Second best *ex ante* efficiency in this case implies that the constrained member's Pareto weight increases by the smallest possible amount so that the member becomes indifferent between staying in the household and leaving (Ligon et al., 2002).

In practice, therefore, a binding participation constraint translates into a change in the Pareto weight designed to achieve exact indifference for the constrained spouse. Formally, the dynamics of the Pareto weight are given by

$$\begin{aligned}\mu_t &= \mu\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, A_t, \mu_{t-1}\right)\\ &= \begin{cases} \mu_{t-1} & \text{if neither (3) nor (4) are binding at } t,\\ \mu_{t-1} + \nu_{2t}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, A_t, \mu_{t-1}\right) & \text{if (4) is binding at } t,\\ \mu_{t-1}/\{1 + \nu_{1t}\left(\mathbf{\Theta}_0, w_{1t}, w_{2t}, A_t, \mu_{t-1}\right)\} & \text{if (3) is binding at } t.\end{cases}\end{aligned}$$

Here ν_{jt} is the Lagrangian multiplier on member j's participation constraint at t, which depends on all variables that the underlying constraint depends on. The multiplier is positive if j's participation constraint binds and zero otherwise. The Pareto weight under LIC is a first-order Markov process where *older* information does not matter once μ_{t-1} is known.

Current wage shocks matter for the Pareto weight, although *not always* – they matter only when a participation constraint binds, in which case the Pareto weight 'jumps' to achieve indifference between the constrained member staying and leaving. Historical information (w_{1t-1}, w_{2t-1}) also matters: this time it matters not only through assets and current wages, but also through last period's Pareto weight μ_{t-1} that summarizes binding past participation constraints. In particular, the shift in the Pareto weight in response to shocks in w_{1t} and w_{2t} depends on its past value μ_{t-1}, i.e. on the history of the household through binding past participation constraints and renegotiations. This means that for some past values of μ, a given current shock may not shift the present Pareto weight, while for other past values of μ, the same shocks will shift it. History thus matters in the limited commitment world, even after controlling for current wages and assets.

The household value function is $V_t^{\text{LIC}}\left(\boldsymbol{\Theta}_0, w_{1t}, w_{2t}, \mu\left(\boldsymbol{\Theta}_0, w_{1t}, w_{2t}, A_t, \mu_{t-1}\right), A_t\right)$ and μ_t enters the state space because it summarizes binding past participation constraints and renegotiations. Pareto weight μ_t summarizes history in a single state variable as shown for example in Marcet and Marimon (2019). Importantly, μ_t is a function of past wages through μ_{t-1}; our test for commitment exploits precisely this feature.

2.2 Nesting of commitment alternatives

Intrahousehold bargaining power in the three commitment alternatives is given by:

$$\begin{array}{ll} \text{full commitment:} & \mu\left(\boldsymbol{\Theta}_0\right), \\ \text{no commitment:} & \mu\left(\boldsymbol{\Theta}_0, w_{1t}, w_{2t}, A_t\right), \\ \text{limited commitment:} & \mu\left(\boldsymbol{\Theta}_0, w_{1t}, w_{2t}, A_t, \mu_{t-1}\right). \end{array}$$

The direction of nesting is already obvious in the above array. Contemporaneous information (i.e. shocks in w_{1t} and w_{2t}) does not matter for the Pareto weight under full commitment, while it matters under both no and limited commitment. Therefore, full commitment is nested within both non-full commitment alternatives, a well-known result in the literature.[18] Consequently, any effect of contemporaneous information on the current Pareto weight can be taken as evidence *against* full commitment. An important caveat is due here: even under FIC, the household value function is $V_t^{\text{FIC}}\left(\boldsymbol{\Theta}_0, w_{1t}, w_{2t}, \mu(\boldsymbol{\Theta}_0), A_t\right)$, i.e. shocks to current wages enter the program as they clearly affect the household's opportunity set (the budget constraint). As such, an effect of contemporaneous information on household labor supply (or consumption) cannot *alone* be taken as evidence against full commitment. We return to this point subsequently.

A fundamental difference between no and limited commitment is in the role history plays in the resource allocation in the household. Under limited commitment, and conditional on assets and current wages, history (i.e. past wage shocks) matters through past events (i.e. binding past participation constraints) that affect bargaining power today. Such past events are summarized by past Pareto weight μ_{t-1} that enters contemporaneous μ_t. By contrast, under no commitment past events do not matter (still conditional on assets and current wages) and are thus irrelevant for current behavior. Therefore, no commitment is nested within limited commitment and a natural exclusion restriction, namely history or past wage shocks, is available to separate the two.

This nesting of the commitment alternatives depends on the dynamic properties of the stochastic elements of the problem, in this case of wages. Wages here are assumed to be first-order Markov: conditional on w_{jt-1}, older wages convey no information for w_{jt}; conditional on w_{jt}, past wages

[18]Chiappori and Mazzocco (2017) show that full commitment is nested within limited commitment while Lise and Yamada (2018) show that full commitment is nested within no commitment. Mazzocco (2007) discusses LIC theoretically and shows that it nests FIC. He implements NIC empirically through which he rejects full commitment.

w_{jt-1} convey no information for w_{jt+1}. This has a useful property: once we control for wages at t, past wages do not affect the future stream of wages. Therefore, conditional on w_{jt}, w_{jt-1} matters for behavior only through assets and, in LIC, the past Pareto weight.

If wages were *second*-order Markov, w_{jt-1} would affect w_{jt+1} even conditional on w_{jt}. Given that $t+1$ wages are unobserved from a time t perspective, past wages would affect two unobserved variables: future wages *and* the Pareto weight in LIC. As future wages matter for both NIC and LIC, past wages would thus no longer serve as an exclusion restriction between NIC and LIC. It would still be possible to obtain an exclusion restriction under a second-order Markov structure, but this would require data over a longer horizon. By contrast, it is likely not possible to obtain a similar exclusion restriction if wages depend on their entire history. Therefore the Markov structure for wages becomes an identifying assumption for commitment. More generally, the stochastic dynamics of distribution factors matter when testing for commitment.

To conclude, limited commitment describes an economy where contemporaneous information as well as history both matter. Conditional on assets and current wages, history matters only through the current Pareto weight. No commitment is a special case of limited commitment in that history does not matter while contemporaneous information still does. Finally, full commitment is a special case of no commitment in that contemporaneous information does not matter.

2.3 Testable implications for household labor supply

Our next task is to take these insights to the data. The three models generate different predictions; moreover, the models are nested, which simplifies the structure of the test. An obvious problem is that the results derived above relate to the dynamics of the Pareto weight, which is not directly observable. One must therefore translate these results into predictions about observed behavior, in our case about individual labor supply in the household. Since both leisure and consumption are taken to be private, a natural approach refers to the notion of *sharing rule*. It is based on the following result in Chiappori (1992):

Proposition 1. *Let* $\{q_{jt}, l_{jt}\}_{t=1,\dots,T}^{j=1,2}$ *be an arbitrary, ex post efficient sequence of individual consumption and labor supply in the household. There exists a sequence* $\{\rho_{1t}, \rho_{2t}\}_{t=1,\dots,T}$ *called sharing rule, satisfying the budget constraints:*

$$A_t + \sum_{j=1}^{2} w_{jt} = \rho_{1t} + \rho_{2t} + \frac{A_{t+1}}{1+r}, \qquad t = 1, \dots, T, \tag{5}$$

and such that for any $t = \{1, \dots, T\}$ *and* $j = \{1, 2\}$, (q_{jt}, l_{jt}) *solves:*

$$\max_{q_{jt}, l_{jt}} u_j(q_{jt}, l_{jt}) \quad \text{under the constraint} \quad w_{jt} l_{jt} + p_t q_{jt} = \rho_{jt}. \tag{6}$$

Conversely, for any given sharing rule satisfying (5)*, any solution* $\{q_{jt}, l_{jt}\}_{t=1,\dots,T}^{j=1,2}$ *to* (6) *is ex post efficient, i.e. there exists a sequence of Pareto weights* $\{\mu_t\}_{t=1,\dots,T}$ *such that* $\{q_{jt}, l_{jt}\}_{t=1,\dots,T}^{j=1,2}$ *solves problem* (1) *subject to* (2)*.*

In words, ex post efficiency requires that individuals maximize their period utility for some given allocation of household expenditures for that period. There exists a one-to-one correspondence between Pareto weights and sharing rule; this correspondence is moreover increasing in the sense that for any given $\rho_t = \rho_{1t} + \rho_{2t}$, a larger μ_t increases ρ_{2t} and decreases ρ_{1t}.

An immediate corollary is the following:

Corollary 1. *Assume individual utilities* u_1 *and* u_2 *are such that both leisure and consumption are normal goods. In each period* t *and for any given* ρ_t*, a larger* μ_t *increases (resp. decreases) individual* 2*'s (resp. individual* 1*'s) leisure and private consumption.*

Such labor supply approach has been used in several studies starting with Chiappori et al. (2002). The underlying mechanism is clear: if μ_t increases, spouse 2 is empowered and attracts a larger share of household resources (i.e. ρ_{2t}); if leisure is a normal good, an income effect increases 2's demand for leisure and consumption (and decreases 1's). We call this a *bargaining* effect as it operates through a shift in the Pareto weight; in this way we distinguish it from traditional income effects that operate also outside the collective framework.

These results suggest a natural test for the various commitment models under consideration. Given the (hypothesized) link between wage shocks and Pareto weight, and the link between Pareto weight and labor supply, we test whether and how current and past wage shocks affect individual labor supply in the household. Below we spell out the theoretical effects on labor supply from *positive* shocks to wages; the effects from negative shocks are just opposite.

Current, i.e. time t*, wage shocks* affect labor supply in all three commitment alternatives. To see this, note that the household value function in all cases takes the form $V_t(\mathbf{\Theta}_0, w_{1t}, w_{2t}, \mu_t, A_t)$. Shocks to w_{1t} and w_{2t} induce income and substitution effects on labor supply and they affect the distribution of future (i.e. $t+1$) wages. Conditional on total income and future wages, one expects that a positive shock to w_{jt} produces a substitution effect that increases j's labor supply as leisure becomes pricier (e.g. Blundell et al., 2016). In NIC and LIC models, a positive shock to w_{jt} also produces a bargaining effect that, through an increase in j's intrahousehold bargaining power, decreases j's labor supply *and* increases i's.

Past, i.e. time $t-1$*, wage shocks* affect current wages and assets in all three commitment alternatives, and they also affect the Pareto weight in LIC. Conditional on current wages and assets, a shock to w_{jt-1} has no effect on labor supply under FIC and NIC but it does under LIC. In LIC, a positive shock to w_{jt-1} improves j's intrahousehold bargaining power (this is a lasting effect from the past as changes in bargaining power are semi-permanent); the bargaining effect decreases j's current labor supply *and* increases i's.

Older, i.e. time $t-2$, wage shocks mimic the time $t-1$ wage shocks. Conditional on assets and wages, older shocks only affect current labor supply through the LIC Pareto weight. While history in LIC is first-order Markov (e.g. Ligon et al., 2002), this is true only if we control for the past Pareto weight μ_{t-1}. As we clearly cannot do this, older wage shocks that may have affected older participation constraints and intrahousehold bargaining power will still have an effect on current labor supply in a similar way that time $t-1$ shocks do. This is true, however, only if more recent shocks have not undone the older shocks' impact.

Three remarks are in order here. First, we caution that the mere effect of *current* shocks on own labor supply is not per se informative about commitment. Conditional on total income, wage shocks still induce substitution effects even in FIC or in the unitary model. Their bargaining effect in NIC and LIC has opposite sign; yet it is unlikely that the bargaining effect will dominate the substitution effect. This is not specific to labor supply: wage or earnings shocks induce substitution effects also on consumption, the latter being justified on the basis of nonseparability with hours that may operate on both intensive and extensive margins of labor supply (Blundell et al., 2016).

Second, while LIC nests NIC and FIC, it remains testable. LIC models allow for an effect of past shocks on current labor supply *and* they constrain the sign of that effect. Favorable shocks to w_{2t-1} can only increase the Pareto weight μ_t; therefore their effect, if any, can only be negative on spouse 2's labor supply – and conversely for a negative shock. Moreover, theory also predicts a positive effect of such shock on the *partner's* labor supply – another testable prediction.

Third, a recurrent problem of dynamic labor supply models is that wage dynamics including future expectations are notably complex. As a result, the empirical estimation of current behavior with respect to current and past wage shocks, which is the object of our theoretical discussion, may be affected by bias and misspecification in the wage process (for instance, here we have assumed a first-order Markov process). Yet, while such bias may in principle introduce a spurious correlation between past wage shocks and current labor supply, the *specific* features suggested by, say, the second remark above are unlikely to hold solely due to such bias. In other words, it would be hard to explain why favorable shocks decrease the person's future labor supply *and* increase the partner's. Nevertheless, past wage shocks may affect future wages in ways not captured by our model; carrying out a test for 'commitment' among singles should thus enable us to assess this.

3 Empirical specification

We test these theoretical predictions using a flexible specification for hours of each spouse. Our specification builds on Mazzocco (2007) who tests for full commitment using public and total private consumption as outcome variables. He obtains the Euler equation from a LIC model with distribution factors and log-linearizes it so that the equation can be estimated without simulating the model. The distribution factors he considers are shocks to current spousal income.

Let H_{jt} be spouse j's hours of work in the labor market (we discuss selection in the labor market in Section 4.1) and let $\Delta h_{jt} = \log H_{jt} - \log H_{jt-1}$ be hours growth. Let $\widehat{y}_{jt}$ be the shock to spouse j's income. Assuming observables and higher than first-order terms away, Mazzocco (2007) estimates (now recast in terms of hours):

$$\begin{aligned}
\Delta h_{1t} &= \alpha_1 + \sum_j \beta_1^j \widehat{y}_{jt} \Delta h_{1t} + \sum_j \gamma_1^j \widehat{y}_{jt} \Delta h_{2t} + \sum_j \delta_1^j \widehat{y}_{jt} + \sum_j \sum_i \zeta_1^{ji} \widehat{y}_{jt} \widehat{h}_{it} + \ldots, \\
\Delta h_{2t} &= \alpha_2 + \sum_j \beta_2^j \widehat{y}_{jt} \Delta h_{1t} + \sum_j \gamma_2^j \widehat{y}_{jt} \Delta h_{2t} + \sum_j \delta_2^j \widehat{y}_{jt} + \sum_j \sum_i \zeta_2^{ji} \widehat{y}_{jt} \widehat{h}_{it} + \ldots,
\end{aligned}$$

where $\widehat{h}_{jt} = \log H_{jt} - \log \bar{H}_{jt}$ and $\bar{H}_{jt}$ is the expected value of hours at t. We refer to Mazzocco (2007) for details on the derivation.

The income shocks appear in multiple places in the equations. The terms with coefficients β_j and γ_j capture variation in the dynamics of hours due to *cross-sectional* variation in bargaining power. The idea is that income shocks may be related to $\mathbf{\Theta}_0$, e.g. to spousal education, their occupation etc. As such, parameters β_j and γ_j are informative about FIC as opposed to the unitary model in which bargaining power does not vary cross-sectionally. The terms with coefficients δ_j and ζ_j capture variation in the dynamics of hours due to *intertemporal* variation in intrahousehold bargaining power, as well as substitution effects as households exploit the opportunities arising from the shocks. While these parameters are specific to the non-FIC alternatives assuming substitution effects away, it is unlikely that such effects are absent even in the case of consumption explored by Mazzocco (2007). For example, Blundell et al. (2016) find that consumption and hours are substitute goods in a simple unitary environment.

Mazzocco (2007) tests for full commitment assessing the statistical significance of δ_j and ζ_j. Leaving aside the caveat we raise above on the interpretation of those parameters given that they also reflect substitution effects, clearly δ_j and ζ_j alone cannot distinguish between NIC and LIC. We thus expand this specification to introduce historical shocks as additional distribution factors. Specifically we estimate equations of the form

$$\begin{aligned}
\Delta h_{1t} = \alpha_1 &+ \sum_j \beta_1^j \widehat{y}_{jt} \Delta h_{1t} + \sum_j \gamma_1^j \widehat{y}_{jt} \Delta h_{2t} + \sum_j \delta_1^j \widehat{y}_{jt} + \sum_j \sum_i \zeta_1^{ji} \widehat{y}_{jt} \widehat{h}_{it} \\
&+ \sum_j \eta_1^j \widehat{y}_{jt-1} + \sum_j \sum_i \vartheta_1^{ji} \widehat{y}_{jt-1} \widehat{h}_{it} + \sum_j \kappa_1^j \widehat{y}_{jt-2} + \sum_j \sum_i \lambda_1^{ji} \widehat{y}_{jt-2} \widehat{h}_{it} + \ldots, \qquad (7)
\end{aligned}$$

$$\begin{aligned}
\Delta h_{2t} = \alpha_2 &+ \sum_j \beta_2^j \widehat{y}_{jt} \Delta h_{1t} + \sum_j \gamma_2^j \widehat{y}_{jt} \Delta h_{2t} + \sum_j \delta_2^j \widehat{y}_{jt} + \sum_j \sum_i \zeta_2^{ji} \widehat{y}_{jt} \widehat{h}_{it} \\
&+ \sum_j \eta_2^j \widehat{y}_{jt-1} + \sum_j \sum_i \vartheta_2^{ji} \widehat{y}_{jt-1} \widehat{h}_{it} + \sum_j \kappa_2^j \widehat{y}_{jt-2} + \sum_j \sum_i \lambda_2^{ji} \widehat{y}_{jt-2} \widehat{h}_{it} + \ldots; \qquad (8)
\end{aligned}$$

we also add a number of additional controls whose role we describe subsequently. Appendix A shows our estimating equations in full detail.

Equations (7)-(8) include terms for spousal income shocks in period $t-1$ (i.e. $\widehat{y}_{jt-1}$). If LIC is the true structure (and for now assuming away wealth effects, mean reversion in hours or other potentially confounding factors), we expect $\eta_1^1 < 0$ and $\eta_2^2 < 0$ (i.e. own past shocks decrease labor supply) and $\eta_1^2 > 0$ and $\eta_2^1 > 0$ (i.e. the partner's past shocks increase labor supply). If NIC is the true structure, we expect $\eta_j^i = 0, \forall j, i$. The terms ϑ_1^{ji} and ϑ_2^{ji} introduce variation in those effects along the hours distribution. Equations (7)-(8) also include terms for spousal shocks in period $t-2$ (i.e. $\widehat{y}_{jt-2}$); associated parameters κ and λ have a similar interpretation.

Now we discuss a number of issues that potentially matter when estimating bargaining effects of past shocks.

1. Wage vs. income shocks. Our discussion in Section 2 is about the theoretical effects of *wage* shocks. Yet, equations (7)-(8) include spousal income shocks as in Mazzocco (2007). We do not observe hourly wages in our data and spousal income is mostly *earnings* rather than *non-labor* income. This introduces a spurious correlation between hours on the left-hand side and earnings on the right-hand side as earnings is the product of wages and hours. Past earnings shocks thus reflect past wage shocks (the item of interest) *and* changes in past hours; the latter may correlate with current hours inducing a mechanical correlation between past shocks and current hours. We address this by controlling for past hours h_{jt-1} and h_{jt-2} so that past earnings shock reflect wage shocks rather than changes in past hours.[19] Obviously we cannot control for *current* hours as this 'kills' the left-hand side variable; we thus expect a mechanical correlation between Δh_{jt} and $\widehat{y}_{jt}$ *in addition to* the bargaining and substitution effects that we discussed previously.

2. Mean reversion in hours. Controlling for past hours h_{jt-1} and h_{jt-2} is crucial for another reason. Through a lifecycle unitary model (e.g. Heathcote et al., 2014; Blundell et al., 2016), one can show that hours h_{jt} are a function of wage shocks at t; similarly, hours h_{jt-1} are a function of wage shocks at $t-1$. As h_{jt-1} is part of Δh_{jt} on the left hand side, past wage shocks correlate with hours growth. Controlling for past hours breaks this mechanical correlation.

3. Income effects. Wage shocks impact household income inducing income effects on household labor supply. To avoid confounding the effect of interest with income effects, which operate also outside the collective model, we control for household income in all periods.

4. Wealth effects. A past wage shock may affect current labor supply through household wealth (A_t in model notation). For example, a positive shock to w_{jt-1} increases current wealth through past savings, thus depressing both spouses' current labor supply. The direction of the effect on j's hours is similar to that of a bargaining effect (i.e. negative) and it is negative also on the partner's hours. We deal with this by empirically controlling for the level and growth of wealth. This serves also another purpose. Equations (7)-(8) stem from the log-linearization of the Euler equation under the assumption that household wealth does not affect the spouses' outside options. Clearly this contradicts our formulation of $\widetilde{V}_{jt}$ in (3)-(4). Relaxing this assumption

[19] Constructing wages as the ratio of earnings over hours does not address the problem as hours would still appear on the right-hand side, i.e. in the denominator of the ratio.

introduces additional terms in the Euler equation, terms that reflect how the outside options shift with wealth. Controlling for wealth thus also accounts for such additional terms.

5. Hours complementarities. Leisure may be complement goods between spouses, introducing a positive response of hours to the partner's wage shock (note, however, that the bargaining effect operates oppositely).[20] We address this possibility empirically by controlling for the partner's hours growth Δh_{it}, $i \neq j$, and the partner's past hours h_{it-1} and h_{it-2}.

6. Consumption complementarities. In a similar spirit, leisure may be complement goods with consumption (e.g. Blundell et al., 2016). If consumption shifts in response to wage shocks, this may induce a feedback effect on labor supply through leisure. We address this possibility empirically by controlling for household consumption growth and past consumption.

7. Expected future wages. Expectations over future wages matter in all three commitment alternatives through the continuation value $\mathbb{E}_t V_{t+1}(\cdot)$. There are two ways to address expectations. One is to predict time $t+1$ wages from the perspective of time t, and introduce them as controls in the estimating equations. The obvious downside is that any prediction is subject to misspecification and prediction error. Another way is to allow current wage controls to 'pick up' the effect of future wages on household behavior (recall that wages are first-order Markov so time t wages convey all the necessary information for future wages). This second approach may be appealing given that the effect of current shocks on labor supply is anyway ambiguous in our context as it aggregates over bargaining and substitution effects (and includes the mechanical correlation with left-hand side hours). We try both approaches in practice; the first one is our baseline.

8. Higher order terms. Mazzocco (2007) carries out a second-order Taylor expansion of the Euler equation, which introduces quadratic terms in hours and distribution factors. In certain specifications subsequently, we also introduce quadratic terms as a way to capture nonlinearities in the various effects. We find that these actually matter.

9. Heterogeneity. The first difference specification eliminates time-invariant individual heterogeneity in hours. In addition, we control for individual and household characteristics such as age, education, race, region of residence, number of children present in the household, and age of the youngest child. However, we exclude the *partner*'s demographics from (7) and (8) respectively, and use them as part of our set of instruments for the partner's hours on the right-hand side. We discuss this further in Section 4.3 and Appendix A.

In estimating the effect of shocks on *singles*' labor supply, we adopt a simplified version of equations (7)-(8). Specifically we estimate an equation of the form

$$\begin{aligned}\Delta h_{jt} = \widetilde{\alpha}_j &+ \widetilde{\beta}_j \widehat{y}_{jt} \Delta h_{jt} + \widetilde{\delta}_j \widehat{y}_{jt} + \widetilde{\zeta}_j \widehat{y}_{jt} \widehat{h}_{jt} \\ &+ \widetilde{\eta}_j \widehat{y}_{jt-1} + \widetilde{\vartheta}_j \widehat{y}_{jt-1} \widehat{h}_{jt} + \widetilde{\kappa}_j \widehat{y}_{jt-2} + \widetilde{\lambda}_j \widehat{y}_{jt-2} \widehat{h}_{jt} + \ldots,\end{aligned} \tag{9}$$

[20]For instance, Cosaert et al. (2020) show that a substantial part of individual leisure is *joint* leisure between spouses; joint leisure is one reason why hours may be complementary between spouses (see also Sevilla et al., 2012). We have kept our model simple by not introducing such elements (effectively public goods).

adding similar controls like those listed above (see also Appendix A).

Hypotheses. Given our specification, we can summarize the various hypotheses one may test. Unitary behavior requires for $j = \{1, 2\}$ and $i = \{1, 2\}$:

$$\mathcal{H}_0^{\text{Unit.}}: \begin{cases} \beta_1^j = \beta_2^i = 0 & \text{variation due to cross-sectional variation in the Pareto weight,} \\ \gamma_1^j = \gamma_2^i = 0 & \text{variation due to cross-sectional variation in the Pareto weight,} \\ \delta_1^j = \delta_2^i = 0 & \text{bargaining (and, in present context, substitution) effect of current shocks,} \\ \eta_1^j = \eta_2^i = 0 & \text{bargaining effect of past shocks,} \end{cases}$$

with parameters ζ, ϑ, and the coefficients on older shocks providing over-identifying restrictions (all zero under $\mathcal{H}_0^{\text{Unit.}}$). Full commitment in a collective model requires:

$$\mathcal{H}_0^{\text{FIC}}: \begin{cases} \delta_1^j = \delta_2^i = 0 & \text{bargaining (and, in present context, substitution) effect of current shocks,} \\ \eta_1^j = \eta_2^i = 0 & \text{bargaining effect of past shocks.} \end{cases}$$

Again, parameters ζ, ϑ, and the coefficients on older shocks provide over-identifying restrictions (all zero under $\mathcal{H}_0^{\text{FIC}}$). No commitment in the collective model requires:

$$\mathcal{H}_0^{\text{NIC}}: \quad \eta_1^j = \eta_2^i = 0 \quad \text{bargaining effect of past shocks,}$$

with parameters ϑ and the coefficients on older shocks providing over-identifying restrictions (all zero under $\mathcal{H}_0^{\text{NIC}}$). Finally, limited commitment is an environment in which:

$$\mathcal{H}_0^{\text{LIC}}: \begin{cases} \eta_j^j < 0 & \text{bargaining effect negative on own labor supply,} \\ \eta_j^i > 0 & \text{bargaining effect positive on partner's labor supply.} \end{cases}$$

Parameters ϑ_1^{ji} and ϑ_2^{ji} provide over-identifying restrictions, as the coefficients on older shocks also do. In all cases, singles also provide multiple over-identifying restrictions. For example, the alternative hypothesis to $\mathcal{H}_0^{\text{FIC}}$ requires that the bargaining effect of current shocks on singles' hours is zero (i.e. $\widetilde{\delta}_j = 0$) while the alternative hypothesis to $\mathcal{H}_0^{\text{LIC}}$ requires that the bargaining effect of past shocks is zero (i.e. $\widetilde{\eta}_j = 0$). Finally, caution is needed in any test for commitment that relies exclusively on parameters δ_1^j, δ_2^j, and $\widetilde{\delta}_j$: in principle these reflect bargaining effects as well as substitution effects (and in our case a spurious correlation between earnings and hours).

4 Empirical implementation

4.1 Data

We use data from the Panel Study of Income Dynamics (PSID).[21] The PSID started in 1968 collecting detailed information on employment and income for a nationally representative sample of households; it was expanded substantially after 1997 in order to enable the collection of information also on household consumption and wealth. The PSID is ideal for the question we ask in this paper as it provides information on labor supply and earnings over multiple periods, and it does so for both spouses in a couple as well as for singles. As our specification includes consumption and wealth controls, we focus on survey years 1999 to 2017 (biennial records).

We focus on the core Survey Research Center (initially representative) sample and we apply minimal only selection. We keep married and single households in which each spouse is between 21 and 65 years old. We keep track of household composition changes; for example, if a given person becomes single or remarries, the resulting household is considered new, i.e. separate from the old one. We require that each household has complete hours, earnings, and demographics records over at least three consecutive periods (i.e. at t, $t-1$, and $t-2$). This is a stringent requirement but we must impose it given the nature of our test (long-term effects of shocks). We also require that households have complete consumption and wealth records over multiple periods as these are used as controls in the estimating equations.

We restrict the sample to those who participate in the labor market.[22] This is because, given the nature of our problem, we must observe wages – and in the case of couples, observe them for both spouses. Shocks to unobserved *wage offers* may also induce bargaining effects even if the person offered a wage does not participate. However, it is not straightforward to account for selection or model shocks to wage offers outside a formal model. Moreover, our interest here lies in separating the commitment alternatives rather than identifying the 'true' bargaining effect of wages in the population. This would not be very useful anyway unless we wanted to study counterfactuals. If we find effects from shocks to labor supply, it is unlikely that such effects do *not* exist also for wage offers. Given these points, we opt to not correct for participation selection.

Among our main variables, hours of work include overtime work, while earnings include pay from all jobs as well as the labor part of business income from unincorporated businesses. Both are measured annually for each spouse in the household. We construct household consumption as the aggregate of several elementary consumption items (e.g. food expenditure, transportation costs, childcare, children's education). Household wealth comprises the present value of the primary residence and several other assets, net of debt. We express all monetary amounts in 2016 prices

[21] Detailed information on the PSID, as well as access to the data, is available at psidonline.isr.umich.edu.

[22] Among those who meet our selection criteria up to this point, 92.8% of married men and 80.7% of married women participate in the labor market. Among singles, participation rates are 87.3% and 83.4% respectively.

using the all urban consumers CPI.[23] We provide details on all variables in Appendix B.

Our baseline sample, i.e. one in which singles and both married spouses participate in the labor market for at least three consecutive periods, has 15,895 household×year observations for couples, 4,088 observations for single men, and 6,218 observations for single women.

Table 1 presents descriptive statistics for the three types of households. Hours of market work follow well known patterns in the literature, with married men working more than single men, who work more than single women, who finally work more than married women. Labor market earnings follow a similar pattern, though earnings of married women surpass those of single women. On average, hours growth is positive when the worker is hit by a favorable earnings shock in the current period, and negative if the shock is adverse. The patterns are mostly opposite when the worker's *partner* is hit by a shock. The patterns are also opposite when the worker was hit by a shock in the *previous* period.

4.2 Earnings process

To estimate equations (7)-(8) for couples, or (9) for singles, we must separate the deterministic (i.e. what one expects to receive in each period) from the stochastic component of earnings (i.e. the earnings shock). Our goal is to study the impact of the latter on household labor supply.

There are several ways to model earnings. One way is to employ a structural model of job search to discipline the shocks to earnings on the basis of on-the-job search, career moves, or involuntary career breaks (e.g. Postel-Vinay and Turon, 2010). Another quasi-reduced-form way is to employ a statistical model for earnings and employment in order to map career moves or unemployment shocks into shocks to earnings (e.g. Altonji et al., 2013). Unfortunately neither way suits us here; they both require to simulate some sort of structural or statistical model and fit it to time series of matched employer-employee data, or of employment/unemployment transitions, both going beyond our data or the scope of this paper.

We resort to a third but popular reduced-form method to separate the deterministic and stochastic components, namely Mincer-style regressions. Let $Y_{jt}^{(\iota)}$ be individual j's earnings in household ι (we temporarily introduce ι to indicate a given multi- or single-member household in the cross-section). We estimate earnings shock $\widehat{y}_{jt}^{(\iota)}$ through

$$Y_{jt}^{(\iota)} = \psi_{j0}^{(\iota)} + \psi_{j1}^{(\iota)}(educ_j^{(\iota)}, marital_j^{(\iota)}) \times age_{jt}^{(\iota)} + \widehat{y}_{jt}^{(\iota)} \tag{10}$$

where $educ_j^{(\iota)}$ indicates education and $marital_j^{(\iota)}$ marital status of individual j. Parameter $\psi_{j0}^{(\iota)}$ is the individual-specific earnings intercept and $\psi_{j1}^{(\iota)}$ is the (potentially individual-specific) slope coefficient on age. There are two differences between standard Mincer regressions and our specification in (10). First, our process allows for vast amounts of heterogeneity through the individual-specific

[23] The PSID data are retrospective so data from the latest survey year 2017 correspond to calendar year 2016. The all urban consumers CPI is provided by the Bureau of Labor Statistics at www.bls.gov/cpi/data.htm.

Table 1: Sample Summary Statistics

	Married couples		Singles	
	Males	Females	Males	Females
Demographics				
Age	43.01	41.33	38.48	42.10
	[10.50]	[10.40]	[11.70]	[12.20]
Years of education	14.3	14.7	14.1	14.2
	[2.1]	[2]	[2.2]	[2.1]
% college education	0.69	0.76	0.65	0.71
	[0.46]	[0.43]	[0.48]	[0.45]
Labor market and other outcomes				
Hours of work (annual)	2,222	1,746	2,050	1,885
	[631]	[667]	[767]	[680]
Earnings (annual, in $1000)	75.16	43.97	51.7	41.63
	[108.62]	[38.26]	[76.01]	[38.51]
Hourly wage	34.58	25.48	25.92	22.32
	[61.5]	[24.4]	[50.7]	[20.6]
Consumption (annual, in $1000)	30.63		16.7	16.55
	[19.27]		[13.89]	[12.55]
Wealth (annual, in $1000)	378.4		168.2	163.2
	[1,229]		[684]	[998.4]
Hours growth given own earnings shock j				
$\Delta h_{jt} \mid \widehat{y}_{jt} > 0$	0.035	0.092	0.134	0.120
$\Delta h_{jt} \mid \widehat{y}_{jt} < 0$	-0.079	-0.105	-0.131	-0.121
$\Delta h_{jt} \mid \widehat{y}_{jt-1} > 0$	-0.084	-0.138	-0.142	-0.152
$\Delta h_{jt} \mid \widehat{y}_{jt-1} < 0$	0.040	0.136	0.136	0.161
Hours growth given partner's earnings shock i				
$\Delta h_{jt} \mid \widehat{y}_{it} > 0$	-0.020	-0.024		
$\Delta h_{jt} \mid \widehat{y}_{it} < 0$	-0.025	0.014		
$\Delta h_{jt} \mid \widehat{y}_{it-1} > 0$	-0.021	0.008		
$\Delta h_{jt} \mid \widehat{y}_{it-1} < 0$	-0.024	-0.018		
Obs. [unique households]	2,752		856	1,189
Survey waves per household	5.78		4.78	5.23
Obs. [households × years]	15,895		4,088	6,218

Notes: The table reports summary statistics (averages, followed by standard deviations in square brackets) in our sample of married couples and singles. All monetary amounts are expressed in 2016 prices. Given that the survey is biennial, a household that is observed for, say, 6 survey waves is in our data for 11 years (e.g. 2001-2011).

terms. Second, earnings in our baseline are in levels rather than in logs. This is because we contrast several of our results to Mazzocco (2007) who also uses earnings levels. As a robustness check, we recast (10) to logs (i.e. $\log Y_{jt}^{(\iota)}$) and replicate all our results.

Our baseline specification restricts $\psi_{j1}^{(\iota)}$ to be the same for individuals of gender j across all households ι in a given marital status (married or single) and education level (less than high school, or high school, or at least some college). In another specification, we let $\psi_{j1}^{(\iota)}$ be fully individual-specific.[24] To predict time $t+1$ earnings from the perspective of time t, we simply obtain the fitted value of (10) incrementing age by one period, i.e. $\mathbb{E}_t Y_{jt+1}^{(\iota)} = \widehat{\psi}_{j0}^{(\iota)} + \widehat{\psi}_{j1}^{(\iota)}(age_{jt}^{(\iota)}+1)$. We assume no change in education or marital status.

The stochastic component of wages may be subject to complex dynamics. For example, a popular assumption in the income dynamics literature is that $\widehat{y}_{jt}^{(\iota)}$ follows a unit root subject to idiosyncratic shocks (e.g. Meghir and Pistaferri, 2004; Blundell et al., 2016). An alternative assumption is that $\widehat{y}_{jt}^{(\iota)}$ is subject to ex ante heterogeneous and persistent growth (e.g. Guvenen, 2007; Browning et al., 2010). It is impossible to separate these modeling choices without second or higher moments of earnings, something that goes beyond our paper. We thus take no stance in this debate, which is facilitated by the fact that our test anyway requires us to explicitly introduce shocks from multiple consecutive periods as distinct regressors.

4.3 Econometric issues

We estimate equations (7)-(8) jointly using the Generalized Method of Moments (Hansen, 1982). Given that both equations include the partner's endogenous hours on the right-hand side, we instrument both equations using contemporary values and up to two lags of individual and household demographics. We exclude *female* age, education, and race from the equation for male hours, and *male* age, education, and race from the equation for female hours. The lags are also excluded from the main equations for the purpose of over-identification. As a robustness check, we instrument also using the partner's and own earnings and hours in period $t-3$. We do not include these instruments in the baseline as they require a fourth consecutive period of data and reduce the size of our sample. Appendix A shows the estimating equations as well as the full set of instruments and exclusion restrictions in detail.[25] For the vast majority of our estimation results subsequently, we cannot reject the validity of our instruments based on Sargan-Hansen J tests.

The instruments serve also to address measurement error, at least partially. Bound et al. (1994) uses a validation study of the early survey waves of the PSID and finds that up to 4% of the variance of earnings and 23% of the variance of hours can be attributed to error.[26] Given that our test does not directly exploit the covariance matrix of earnings and hours, it is hard to use these estimates to 'correct' the data. Yet, our instrumental variables approach can address

[24] We also try a quadratic specification in age. This does not change our results subsequently so for brevity we do not include these results in the discussion.

[25] We do not instrument current or past wage shocks; instead we treat such shocks as exogenous as in Blundell et al. (2016) and other studies. One difficulty in instrumenting for wages in the present context is that our main estimating equations include as distinct regressors many otherwise potential instruments (for example, historical shocks). Due to the nature of our problem -the long-run effects of wage shocks- the sort of instruments that other studies typically use for wages are simply not available to us.

[26] The validation study is subject to certain limitations. For example, it only surveyed men in a single manufacturing firm in 1983 and 1987. The PSID was redesigned in 1997 and it is not known whether and how the nature of error changed since then; or how the error matters for *female* earnings and hours.

measurement error in right-hand side earnings, assuming the error has the usual classical nature. A complication arises with error in hours as hours are on both sides of the equations; the errors in the left- and certain right-hand side variables thus correlate. There is no straightforward fix to this but, fortunately, the coefficients on right-hand side *hours* are not of our primary interest.

We estimate equation (9) for single men and single women separately from the system of equations for married people. The samples of married couples, single men, and single women are separate, and we do not apply any cross-equation restrictions. We instrument using up to two lags of demographics (and historical earnings and hours as a robustness check) in order to address measurement error; see again Appendix A.

We use the GMM optimal weighting matrix in our baseline, and we calculate asymptotic standard errors based on this weighting scheme. Given the well-known small sample bias this choice of matrix may induce (Altonji and Segal, 1996), we also use a weighting matrix that allows for arbitrary correlation among observations within households and we bootstrap the standard errors (Horowitz, 2001). We find no meaningful differences between the two sets of results.

Finally, our estimating equations include variables $\widehat{h}_{jt}$, namely the difference between log hours and their expected value. We calculate this expected value as the sample mean of hours by gender and marital status.

5 Results

We present our results in the following format. The first two columns in all subsequent tables are for the test for full commitment, in the spirit of Mazzocco (2007), for male and female hours respectively. Specifically, we test whether and how current shocks affect labor supply. The middle two columns then introduce period $t-1$ shocks as additional distribution factors; such shocks allow us to separate NIC and LIC. Finally, the last two columns introduce shocks also in period $t-2$; under LIC, older shocks may have similar effects to immediately past shocks so long as they are not undone by them.

Main results. Table 2 presents the baseline results on married couples from the linear version of estimating equations (7)-(8); i.e. the version that does not include second-order terms in hours and shocks. See also companion Appendix Table C.1. These results use the baseline earnings process whose slope coefficient $\psi_{j,1}^{(\iota)}$ is marital status and education specific. Three points emerge.

First, in replicating Mazzocco (2007) we find that hours associate positively with current own shocks and negatively with the partner's (columns 1-2, panel B). We expect a positive association between hours and current own shocks (i.e. $\delta_j^j > 0$): this parameter reflects the aggregate of the substitution and bargaining effects of current shocks; it also includes the mechanical correlation between left-hand side hours and right-hand side earnings. As such, this parameter alone cannot

Table 2: Married Couples, Linear Test for Commitment

Hours growth Δh_{jt}	Current shocks (1) Males $j=1$	Current shocks (2) Females $j=2$	Current shocks and shocks at $t-1$ (3) Males $j=1$	Current shocks and shocks at $t-1$ (4) Females $j=2$	Current shocks and shocks up to $t-2$ (5) Males $j=1$	Current shocks and shocks up to $t-2$ (6) Females $j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.583***	-0.885	-0.255***	-1.808***	-0.224***	-1.888***
	(0.039)	(0.699)	(0.035)	(0.648)	(0.037)	(0.647)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.656	-0.922***	-0.404	-0.131	-0.332	-0.075
	(0.674)	(0.092)	(0.545)	(0.080)	(0.545)	(0.071)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.080***	-0.175**	0.130***	-0.354***	0.134***	-0.362***
	(0.016)	(0.073)	(0.013)	(0.098)	(0.013)	(0.093)
$\widehat{y}_{2t}$	-0.165***	0.413***	-0.302***	0.589***	-0.271***	0.578***
	(0.059)	(0.052)	(0.071)	(0.056)	(0.074)	(0.057)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.082***	0.265***	-0.082***	0.265***
			(0.013)	(0.062)	(0.012)	(0.063)
$\widehat{y}_{2t-1}$			0.103***	-0.216***	0.082***	-0.195***
			(0.032)	(0.039)	(0.031)	(0.039)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.021	0.033**
					(0.017)	(0.014)
$\widehat{y}_{2t-2}$					0.044	-0.102***
					(0.029)	(0.030)
E. Selected other controls:						
past hours			yes	yes	yes	yes
income effects			yes	yes	yes	yes
wealth effects			yes	yes	yes	yes
$\mathbb{E}_t$ earnings $t+1$	yes	yes	yes	yes	yes	yes
Obs. [hhs $\times$ Δyear]	10,209		10,209		10,209	

Notes: The table reports selected coefficients from the linear test for commitment on married couples. Columns (1)-(2) test for full commitment; columns (3)-(4) introduce shocks in period $t-1$; columns (5)-(6) include shocks up to period $t-2$. Results are for the baseline earnings shock with ψ_{j1} marital status and education specific. The specification includes a constant and controls for demographics, consumption growth, and partner's hours; see Appendix Table C.1 for additional results. Δyear refers to a first difference over a biennial period. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

be seen as evidence against full commitment: a positive and strong substitution effect, which operates also in the unitary model, can deliver $\delta_j^j > 0$. We also expect a negative association between hours and the partner's current shocks (i.e. $\delta_j^i < 0$, $i \neq j$): this parameter reflects a negative income effect from the partner's shocks since we do not control for family income in this specification. The effect becomes stronger in the next columns reflecting the substitutability between partners' hours while keeping family income fixed. This discussion thus raises a caveat for any study that relies exclusively on current shocks to test for commitment: even in the absence of bargaining effects, current shocks induce changes in behavior as the household exploits the opportunities created by such shocks.

Second, in introducing shocks from period $t-1$ we find that hours associate negatively with past own shocks but positively with those of the partner (columns 3-4, panel C). As we now control for past hours, family income and family wealth among other things, the effect of past shocks cannot be explained by income or wealth effects, or by their effect on past hours. Moreover, the signs of the coefficients ($\eta_j^j < 0$ and $\eta_j^i > 0$) are exactly as predicted by the theoretical arguments sketched above for LIC: favorable past shocks improve intrahousehold bargaining power of the spouse that receives them, resulting in a decrease in his/her labor supply (thus an increase in his/her leisure) and an increase in their partner's labor supply. No commitment requires that $\eta_j^j = \eta_j^i = 0$ so this set of results serves as preliminary evidence against $\mathcal{H}_0^{\text{NIC}}$ and in favor of $\mathcal{H}_0^{\text{LIC}}$.

Third, period $t-2$ shocks have similar qualitatively effects as period $t-1$ shocks even though their magnitude is smaller (columns 5-6, panel D). Under limited commitment, *older* than $t-1$ information does not matter for current behavior as long as we control for past Pareto weight μ_{t-1}. Clearly this is not feasible so historical shocks may have an effect on current labor supply if they had previously shifted intrahousehold bargaining power at the time. Moreover, the direction of the effect should be similar to that of immediately past shocks, which is precisely what we observe. The coefficients ($\kappa_j^j < 0$ and $\kappa_j^i > 0$) are exactly as predicted by LIC while their magnitude is smaller than those of $t-1$ shocks, likely because more recent shocks have undone part of the older shocks' effect. We find the presence of such effects remarkable especially given the large number of variables (past hours, income, wealth among others) that we control for in all periods.[27]

Past shocks affect married couples' labor supply in the exact same way that LIC postulates; yet if the 'power shift' story is true, it should not be observed among singles. Table 3 presents the baseline results on singles from the linear version of estimating equation (9) (see also Appendix Table C.2); we use again the baseline earnings process. Two main points stand out. First, current shocks affect singles' labor supply as individuals exploit the possibilities created by such shocks (columns 1-2, panel B). Yet, while one expects a positive association ($\widetilde{\delta}_j > 0$) dictated by a positive substitution effect *and* the mechanical correlation between left-hand side hours and right-hand side earnings, the effect is negative among single men (columns 3 & 5, panel B). This may indicate some sort of misspecification in our test, a point to which we return shortly. Second, all past shocks induce *positive* effects among both men and women (columns 3-6, panels C & D). Therefore, there is a striking difference between married individuals ($\eta_j^j < 0$, $\kappa_j^j < 0$) and singles ($\widetilde{\eta}_j > 0$, $\widetilde{\kappa}_j > 0$), indicating that singles behave -for now- differently from couples.[28]

[27]The sample is the same across all columns of Table 2 even though columns to the left require a shorter horizon than those to the right. We do not want differences across columns to arise from differences in the sample so we require throughout that households are observed for at least three consecutive periods, i.e. what columns 5-6 necessitate. We have fewer observations than in Table 1 because the estimating equations are in first differences.

[28]As in the case of married couples, we keep the same samples of singles across columns of Table 3. We have

Table 3: Singles, Linear Test for 'Commitment'

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	0.070		-0.017		-0.025	
	(0.044)		(0.034)		(0.034)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-1.059***		-1.053***		-1.227***
		(0.078)		(0.074)		(0.085)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	-0.047		-0.226***		-0.208***	
	(0.034)		(0.028)		(0.029)	
$\widehat{y}_{2t}$		0.179***		0.115***		0.067
		(0.051)		(0.043)		(0.044)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			0.154***		0.161***	
			(0.036)		(0.036)	
$\widehat{y}_{2t-1}$				0.213***		0.118***
				(0.042)		(0.043)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					0.026	
					(0.039)	
$\widehat{y}_{2t-2}$						0.107***
						(0.038)
E. Selected other controls: as in Table 2						
Obs. [hhs × Δyear]	2,318	3,766	2,318	3,766	2,318	3,766

Notes: The table reports selected coefficients from the linear test for 'commitment' on singles. See detailed notes in Table 2. See Appendix Table C.2 for additional results.

The results so far come from the *linear* version of our estimating equations; such linear specification stems from a first-order approximation to the household Euler equation. Given the hint of misspecification among singles above, we repeat the test for commitment using a *quadratic* version of our estimating equations. The quadratic specification stems from a second-order approximation to the Euler equation, it retains all parameters presented above, and it allows for nonlinearities through a small number of quadratic terms in hours and shocks. Appendix A shows the quadratic terms in detail; we use again the baseline earnings process.

Table 4 presents results on married couples from the quadratic version of estimating equations (7)-(8); see also Appendix Table C.3. Three points stand out. First, the effects of current shocks are similar qualitatively (and in most cases quantitatively) to those in the linear specification: hours associate positively with current own shocks ($\delta_j^j > 0$) and negatively with the partner's

fewer observations than in Table 1 because the estimating equations are in first differences.

Table 4: Married Couples, Quadratic Test for Commitment

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1) Males	(2) Females	(3) Males	(4) Females	(5) Males	(6) Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.048	-0.800	0.054	-0.796	0.103**	-1.280**
	(0.036)	(0.586)	(0.034)	(0.525)	(0.050)	(0.573)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.158	-0.242***	0.116	0.076	0.033	0.093
	(0.542)	(0.078)	(0.490)	(0.067)	(0.478)	(0.064)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.102***	-0.126*	0.129***	-0.208**	0.130***	-0.291***
	(0.024)	(0.069)	(0.042)	(0.093)	(0.046)	(0.103)
$\widehat{y}_{2t}$	0.015	0.312***	-0.067	0.460***	-0.091	0.400***
	(0.050)	(0.051)	(0.066)	(0.056)	(0.066)	(0.064)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.058***	0.137***	-0.083***	0.250***
			(0.015)	(0.052)	(0.017)	(0.073)
$\widehat{y}_{2t-1}$			-0.018	-0.265***	-0.016	-0.212***
			(0.048)	(0.037)	(0.047)	(0.045)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.013*	0.024*
					(0.007)	(0.013)
$\widehat{y}_{2t-2}$					0.051	-0.086**
					(0.031)	(0.035)
E. Selected other controls:						
past hours			yes	yes	yes	yes
income effects			yes	yes	yes	yes
wealth effects			yes	yes	yes	yes
$\mathbb{E}_t$ earnings $t+1$	yes	yes	yes	yes	yes	yes
quadratic terms	yes	yes	yes	yes	yes	yes
Obs. [hhs × Δyear]	10,209		10,209		10,209	

Notes: The table reports selected coefficients from the quadratic test for commitment on married couples. See detailed notes in Table 2. See Appendix Table C.3 for additional results.

shocks ($\delta_j^i < 0$). Second, period $t-1$ shocks have similar effects as in the linear specification ($\eta_j^j < 0$ and $\eta_j^i > 0$), though the effect from the male shock is halved in columns 3-4. Third, period $t-2$ shocks induce similar effects to immediately past shocks ($\kappa_j^j < 0$ and $\kappa_j^i > 0$), albeit smaller in magnitude. The relevant parameters are quantitatively very similar to those in the linear specification. The effects of all types of past shocks are consistent with LIC: favorable past news reduce own labor supply and increase the partner's. Given all the potentially confounding channels we account for across multiple periods (past hours, income effects, wealth effects), we interpret this result through the lenses of a 'power shift': past news affect household labor supply

Table 5: Singles, Quadratic Test for 'Commitment'

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.006		-0.025		-0.032	
	(0.029)		(0.025)		(0.025)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-0.132***		0.193***		0.130*
		(0.051)		(0.069)		(0.071)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.202***		0.170***		0.159***	
	(0.030)		(0.031)		(0.032)	
$\widehat{y}_{2t}$		0.326***		0.504***		0.469***
		(0.033)		(0.039)		(0.042)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.103***		-0.105***	
			(0.032)		(0.034)	
$\widehat{y}_{2t-1}$				-0.371***		-0.368***
				(0.042)		(0.044)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.019	
					(0.031)	
$\widehat{y}_{2t-2}$						-0.045
						(0.038)
E. Selected other controls: as in Table 4						
Obs. [hhs $\times$ Δyear]	2,318	3,766	2,318	3,766	2,318	3.766

Notes: The table reports selected coefficients from the quadratic test for 'commitment' on singles. See detailed notes in Table 2. See Appendix Table C.4 for additional results.

through their impact on intrahousehold bargaining power.

We now turn to singles. Table 5 presents results on single men and single women from the quadratic version of estimating equation (9); see also Appendix Table C.4. There are three main findings. First, the effect of current shocks on individual labor supply turns positive ($\widetilde{\delta}_j > 0$) as theory predicts. Second, the effect of period $t-1$ shocks becomes negative ($\widetilde{\eta}_j < 0$), which is now similar to the effect that past shocks induce on couples' labor supply. Third, older shocks (i.e. from period $t-2$) no longer matter for singles' behavior: the magnitude of their effect drops substantially compared to the linear specification and it becomes statistically insignificant. This is a feature that we observe consistently in most of our additional results below, unlike couples for whom older shocks consistently matter in a way disciplined by LIC.

Finally, terms that theoretically reflect the cross-sectional variation in intrahousehold bargaining power in couples (panel A) enter significantly in both linear and quadratic versions of our test. As in Mazzocco (2007) we reject that these terms are zero at any conventional significance level. While these results are in line with the static collective model, note that shocks to earnings are not conventional distribution factors in our framework as they clearly also affect the budget constraint (see for instance footnote 12). Therefore, current shocks affect household labor supply also outside the collective model, which explains why some of these terms also enter singles' hours (though with the opposite sign in many cases).

Additional results. We check the robustness of the results to modeling assumptions made in our empirical implementation. Our focus is on the effects from period $t-1$ and $t-2$ shocks, on the effects of current shocks, and on how married couples compare to singles. Appendix C presents results from: a flexible earnings process with individual specific slope coefficient $\psi_{j,1}$ (Tables C.5-C.6); a log earnings process with slope coefficient $\psi_{j,1}$ marital status and education specific (Tables C.7-C.8); an expanded set of instruments that include own and spousal earnings and hours in period $t-3$ (Tables C.9-C.10); a GMM weighting scheme that accounts for arbitrary correlation among observations within households and in which the block bootstrap is used to estimate the standard errors (Tables C.11-C.12). We also repeat everything excluding expected earnings at $t+1$ from the right-hand side as well as, separately, using a quadratic earnings process in age. These results do not differ from the rest so we do not show them in the Appendix. In all cases, we estimate the quadratic version of our test given that it nests the linear version.

Our additional results are qualitatively (and often quantitatively) very similar to the baseline in Tables 4-5. Period $t-1$ shocks affect own labor supply similarly between couples and singles. However, period $t-1$ shocks also affect the partner's labor supply consistent with LIC. Period $t-2$ shocks also enter couples' labor supply significantly and in a way consistent with LIC. Here we observe a discrepancy with singles as, in many (but not all) cases, these older shocks do not affect singles' hours. Finally, current own shocks enter always with the expected positive sign.

A closer look at the comparison between couples and singles. The results from our most general specification indicate that period $t-1$ shocks decrease own labor supply among couples, consistent with LIC, but also among singles. So bargaining may not be the only explanation behind the pattern for couples. However, the results also show that $t-1$ shocks increase *the partner's* labor supply, consistent with LIC, and period $t-2$ shocks exhibit similar patterns mostly among couples. So what may explain the effect observed on singles? We believe that possible misspecification in the dynamics of wages is the main reason why past shocks affect singles' labor supply despite the large number of mechanisms for which we account (past hours, wealth effects, etc).

It is possible that wages are subject to richer dynamics than what we allow for here, inducing complex effects from past wages to current behavior. For example, we may have misspecified earnings process (10). This could be because some shock may have permanently improved an agent's future wage profile (shocks in (10) average out to zero), or for other reasons. While we do control for *expected* future income, this is only as good as our projection based on information up to t. A positive permanent shock at $t-1$ may induce a *future wealth* or *future income* effect on labor supply suppressing current hours, thus explaining the pattern we observe among both singles and couples. Another (but related) example is that shocks may be *higher*-order Markov. Shocks at $t-1$ may convey information about the future stream of wages even after controlling for $\widehat{y}_{jt}$ and $\mathbb{E}_t y_{jt+1}$, thus affecting current hours for reasons unrelated to bargaining. A final example is that $t-1$ shocks may convey information about *higher* moments of the distribution of time t wages even if the first-order Markov assumption is a good approximation to the *average* wage profile. A particular case that fits the patterns we observe among singles is one in which positive shocks at $t-1$ signal less mass in the tails of the distribution of wages at t or later. Through a decrease in future uncertainty, past wages thus suppress current labor supply as agents need to accumulate less wealth to satisfy their precautionary motive.

These examples would all imply a negative effect from past shocks to *own* labor supply, an effect unrelated to bargaining that operates similarly among couples and singles. What they additionally imply, however, is a *similar* effect on the *partner's* labor supply – something that we do not observe. A future wealth or income effect would also suppress the partner's labor supply, as a decrease in uncertainty would also do. A violation of the first-order Markov property could potentially imply positive or negative effects from past shocks to current hours; yet it is unlikely that such neglected links to future wage distributions generate the precise pattern we see among couples: while past shocks decrease own labor supply, they also increase the partner's. If anything, past shocks should affect men's and women's future wage distributions similarly especially given that wages are typically correlated within the couple (e.g. Hyslop, 2001). Yet, the impact we observe is opposite: shocks that increase a person's labor supply decrease the partner's.

To conclude, even though we may have not fully captured the wage dynamics (as proved by the results on singles), whatever we are missing is unlikely to explain the effect of past shocks on the partner's labor supply. If anything the effect would go in the opposite direction. The cross-effects from shocks both at $t-1$ and at $t-2$, as well as the rest of the couples' results, are fully consistent with the 'power shift' story, therefore with LIC.

Summary. We offer three main take-away points. First, current shocks affect own hours reflecting a substitution between leisure and labor supply, a mechanical association between left-hand side hours and right-hand side earnings, and a bargaining effect in NIC and LIC. They also affect the partner's hours reflecting the substitutability of hours in the couple, as well as the bargaining effect in NIC and LIC. We find that the overall effect on own hours is consistently positive reflecting a strong substitution effect. This effect of current shocks had previously been seen as evidence against full commitment. We argue here that this effect should be interpreted with caution precisely because it aggregates over multiple margins of behavior. This is not specific to household labor supply; substitution effects from wage or income shocks also operate on consumption as, for instance, Blundell et al. (2016) show in a unitary model. Such effects on consumption reflect complementarities between leisure and consumption that may operate both on the intensive and extensive margins of labor supply. Neither the direction of the consumption-leisure complementarity nor the sign of the bargaining effect in the intertemporal collective model (which is the effect that matters for commitment) are determined a priori, making it hard to test for full commitment when consumption is the outcome variable. Household labor supply disciplines the sign of the bargaining effect and the sign of the complementarity with leisure, thus offering advantages when testing for the presence of a bargaining effect.

Second, immediately past shocks (i.e. from period $t-1$) affect household labor supply in a way predicted by LIC. Past shocks decrease own labor supply and increase the partner's; this is consistent with a 'power shift' story in which favorable past shocks improved intrahousehold bargaining power of the spouse that received them. In LIC such shift in intrahousehold bargaining power is semi-permanent, therefore it has lasting effects on behavior. We use our most general results in columns 5-6 in Table 4 to evaluate how a shock to male earnings at $t-1$ affects household labor supply at t. To do this, we calculate the partial derivatives of hours growth to shocks of various types. Suppose that annual earnings of the husband increase unexpectedly by 5,000 dollars. This corresponds to a shock at the 67$^{\text{th}}$ percentile of the distribution of male shocks and represents a 8.3% increase in male earnings from the median. The partial derivative of male hours growth is -0.085 while that of female hours growth is 0.261. To get a sense of these magnitudes, note that the former number corresponds to the 30$^{\text{th}}$ percentile of male hours growth while the latter corresponds to the 85$^{\text{th}}$ percentile of female hours growth.[29] Older shocks (i.e. from period $t-2$) also affect household labor supply in a way consistent with LIC. Their effect, however, is smaller than of immediately past shocks as the latter likely undo part of the older shocks' impact. The partial derivatives of hours growth with respect to a shock at the 67$^{\text{th}}$ percentile are -0.023 (43$^{\text{th}}$ percentile of male hours growth) and 0.042 (63$^{\text{th}}$ percentile of female hours growth) respectively. Overall, our results on couples allow us to reject hypothesis $\mathcal{H}_0^{\text{NIC}}$ at standard significance levels while we cannot reject $\mathcal{H}_0^{\text{LIC}}$.[30]

Third, unlike earlier research we test for 'commitment' among singles. The idea is that if the 'power shift' story is the only explanation for couples' behavior with respect to past shocks, then singles should behave differently. The linear version of our test delivers favorable results: past shocks shift singles' hours in the opposite direction from couples. However, the quadratic version of our test, which nests the linear specification, reverses most of the signs of these effects. Specifically, singles' hours now respond to period $t-1$ shocks in a way that is similar to couples. Unlike couples, however, older shocks have mostly negligible effect on singles' labor supply while they do have an effect among couples that is consistent with LIC. Moreover, past shocks consistently affect the

[29]We calculate all partial derivatives at the sample average of all other variables that appear in them.

[30]The results on couples also allow us to reject $\mathcal{H}_0^{\text{Unit.}}$ and $\mathcal{H}_0^{\text{FIC}}$ at standard significance levels, albeit with the aforementioned caveat about the interpretation of the effects from current shocks.

partner's labor supply in the precise same way that LIC predicts. While we offer some plausible explanations for the negative impact of past shocks on singles' hours, we also argue that those explanations are unlikely to explain the strong positive cross-effect we observe among couples. Such cross-effect is fully consistent with LIC.

We believe that neglected wage dynamics is the likely reason why past shocks affect singles' hours in spite of the large number of mechanisms for which we account. Such neglected dynamics may induce complex effects from past wages to current behavior. This problem is only aggravated here given that the shocks we employ are not conventional distribution factors as they enter the budget constraint itself. Yet, this issue applies to any test for intra-household commitment or commitment among households in village economies. Successful such tests must first account for the stochastic dynamics in any factor that matters for the outside option, before assessing the impact of those factors on behavior. Ideally they must do so outside the commitment test itself. Neglected dynamics may affect behavior through the 'inside' option and independently from shifts in the Pareto weight, therefore possibly erroneously rejecting one commitment regime in favor of another. More generally, our exercise also highlights that singles offer informative restrictions that should be part of any hypothesis test for commitment.[31]

6 Conclusions

We developed an intertemporal collective model of household labor supply in order to discuss three prominent cases of intrahousehold commitment: full commitment, no commitment, and limited commitment. Recent literature on intrahousehold dynamics either outright models limited commitment (e.g. Mazzocco et al., 2014; Voena, 2015), or contrasts the workings and implications of full and limited commitment (e.g. Mazzocco, 2007; Chiappori and Mazzocco, 2017) or of full and no commitment (e.g. Lise and Yamada, 2018). To the best of our knowledge, ours is the first paper that brings the three commitment alternatives together and presents their implications for household labor supply.

We offer three contributions to the literature. First, we characterize the dynamics of household labor supply under all three commitment alternatives. Current and past news are conditionally irrelevant for household behavior under full commitment, past news are conditionally irrelevant under no commitment, while past news matter under limited commitment in a very specific way. Second, we show that limited commitment nests no commitment, which in turn nests full commitment. Nesting and natural exclusion restrictions based on the role of current and past news allow us to devise a test that distinguishes among all three commitment alternatives. Third, we imple-

[31]It is harder to find the analog of singles when testing for risk sharing in village economies (e.g. Townsend, 1994). While singles are well defined when it comes to intra-household commitment, testing for inter-household commitment or lack thereof is in many ways equivalent to testing for the presence of 'single' households in the village economy, i.e. households that do not share risk with other households.

ment the test on recent data from the PSID and we find that couples' labor supply is consistent with limited commitment. Unlike earlier research, we also run our test on singles and we find that past shocks affect singles' hours in a way that partially mimics couples. Yet, couples' behavior exhibits distinct features consistent with limited commitment (significant impact of older shocks, cross-effects from past shocks to partner's hours), which plausible mechanisms behind the pattern of singles are unlikely to explain.

The extent to which individuals commit to their partner for life is crucial for understanding how policy may affect household formation, divorce, income, wealth, and child development among other things. The idea behind our test goes beyond income shocks to all sort of distribution factors one may think matter for household members' outside options. It also goes beyond intra-household commitment to more general settings of risk sharing, such risk sharing among village households.

References

Altonji, J. G. and Segal, L. M. (1996). Small-sample bias in GMM estimation of covariance structures. *Journal of Business & Economic Statistics*, 14(3):353–366.

Altonji, J. G., Smith Jr, A. A., and Vidangos, I. (2013). Modelling earnings' dynamics. *Econometrica*, 81(4):1395–1454.

Apps, P. F. (1981). *A Theory of Inequality and Taxation*. Cambridge University Press.

Apps, P. F. (1982). Institutional inequality and tax incidence. *Journal of Public Economics*, 18(2):217–242.

Apps, P. F. and Jones, G. (1986). Selective taxation of couples. *Journal of Economics*, 5:1–15.

Arellano, M., Blundell, R., and Bonhomme, S. (2017). Earnings and consumption dynamics: A nonlinear panel data framework. *Econometrica*, 85(3):693–734.

Armand, A., Attanasio, O., Carneiro, P., and Lechene, V. (2020). The effect of gender-targeted conditional cash transfers on household expenditures: Evidence from a randomized experiment. *The Economic Journal*.

Ashworth, J. S. and Ulph, D. T. (1981). Household models. In Brown, C. V., editor, *Taxation and Labour Supply*. Allend and Unwin.

Attanasio, O. P. and Lechene, V. (2014). Efficient responses to targeted cash transfers. *Journal of Political Economy*, 122(1):178–222.

Becker, G. S. (1991). *A Treatise on the Family*. Harvard University Press.

Bergstrom, T. C. (1989). A fresh look at the rotten kid theorem–and other household mysteries. *Journal of Political Economy*, 97(5):1138–1159.

Blau, D. M. and Goodstein, R. M. (2016). Commitment in the household: Evidence from the effect of inheritances on the labor supply of older married couples. *Labour Economics*, 42:123–137.

Blundell, R., Chiappori, P.-A., and Meghir, C. (2005). Collective labor supply with children. *Journal of Political Economy*, 113(6):1277–1306.

Blundell, R., Pistaferri, L., and Saporta-Eksten, I. (2016). Consumption inequality and family labor supply. *American Economic Review*, 106(2):387–435.

Bound, J., Brown, C., Duncan, G. J., and Rodgers, W. L. (1994). Evidence on the validity of cross-sectional and longitudinal labor market data. *Journal of Labor Economics*, 12(3):pp. 345–368.

Bourguignon, F. (1984). Rationalité individuelle ou rationalité stratégique: le cas de l'offre familiale de travail. *Revue Économique*, 29:147–162.

Bourguignon, F., Browning, M., and Chiappori, P.-A. (2009). Efficient intra-household allocations and distribution factors: Implications and identification. *Review of Economic Studies*, 76(2):503–528.

Bourguignon, F., Browning, M., Chiappori, P.-A., and Lechene, V. (1993). Intra household allocation of consumption: A model and some evidence from french data. *Annales d'Economie et de Statistique*, 29:137–156.

Browning, M., Bourguignon, F., Chiappori, P.-A., and Lechene, V. (1994). Income and outcomes: A structural model of intrahousehold allocation. *Journal of Political Economy*, 102(6):1067–1096.

Browning, M. and Chiappori, P.-A. (1998). Efficient intra-household allocations: A general characterization and empirical tests. *Econometrica*, 66(6):1241–1278.

Browning, M., Chiappori, P.-A., and Lewbel, A. (2013). Estimating consumption economies of scale, adult equivalence scales, and household bargaining power. *Review of Economic Studies*, 80(4):1267–1303.

Browning, M., Chiappori, P.-A., and Weiss, Y. (2014). *Economics of the Family*. Cambridge University Press.

Browning, M., Ejrnæs, M., and Alvarez, J. (2010). Modelling income processes with lots of heterogeneity. *Review of Economic Studies*, 77(4):1353–1381.

Campaña, J. C., Gimenez, J. I., and Molina, J. A. (2018). Efficient labor supply for Latin families: Is the intra-household bargaining power relevant? *IZA Discussion Papers N. 11695*.

Campaña, J. C., Gimenez-Nadal, J. I., and Molina, J. A. (2017). Increasing the human capital of children in Latin American countries: The role of parents' time in childcare. *Journal of Development Studies*, 53(6):805–825.

Cherchye, L., De Rock, B., and Vermeulen, F. (2012). Married with children: A collective labor supply model with detailed time use and intrahousehold expenditure information. *American Economic Review*, 102(7):3377–3405.

Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica*, 56(1):63–90.

Chiappori, P.-A. (1992). Collective labor supply and welfare. *Journal of Political Economy*, 100(3):437–467.

Chiappori, P.-A. (1997). Introducing household production in collective models of labor supply. *Journal of Political Economy*, 105(1):191–209.

Chiappori, P.-A. (2016). Equivalence versus indifference scales. *Economic Journal*, 126(592):523–545.

Chiappori, P.-A. and Ekeland, I. (2006). The micro economics of group behavior: General characterization. *Journal of Economic Theory*, 130(1):1–26.

Chiappori, P.-A. and Ekeland, I. (2009). The micro economics of efficient group behavior: Identification. *Econometrica*, 77(3):763–799.

Chiappori, P.-A., Fortin, B., and Lacroix, G. (2002). Marriage market, divorce legislation, and household labor supply. *Journal of Political Economy*, 110(1):37–72.

Chiappori, P.-A. and Mazzocco, M. (2017). Static and Intertemporal Household Decisions. *Journal of Economic Literature*, 55(3):985–1045.

Cosaert, S., Theloudis, A., and Verheyden, B. (2020). Togetherness in the household. LISER Working Paper Series 2020-01, LISER.

Donni, O. and Chiappori, P.-A. (2011). Nonunitary models of household behavior: A survey of the literature. In Molina, J. A., editor, *Household Economic Behaviors*, pages 1–40. Springer New York.

Donni, O. and Molina, J. A. (2018). Household collective models: Three decades of theoretical contributions and empirical evidence. *IZA Discussion Paper N. 11915*.

Dubois, P., Jullien, B., and Magnac, T. (2008). Formal and Informal Risk Sharing in LDCs: Theory and Empirical Evidence. *Econometrica*, 76(4):679–725.

Duflo, E. (2003). Grandmothers and granddaughters: old age pensions and intrahousehold allocation in south africa. *The World Bank Economic Review*, 17(1):1–25.

Dunbar, G. R., Lewbel, A., and Pendakur, K. (2013). Children's resources in collective households: Identification, estimation, and an application to child poverty in Malawi. *American Economic Review*, 103(1):438–471.

Giménez-Nadal, J. I. and Molina, J. A. (2016). Commuting time and household responsibilities: Evidence using propensity score matching. *Journal of Regional Science*, 56(2):332–359.

Guvenen, F. (2007). Learning your earning: Are labor income shocks really very persistent? *American Economic Review*, 97(3):687–712.

Haddad, L. and Hoddinott, J. (1994). Women's income and boy-girl anthropometric status in the Côte d'Ivoire. *World Development*, 22(4):543–553.

Hansen, L. P. (1982). Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica*, 50(4):1029–1054.

Heathcote, J., Storesletten, K., and Violante, G. L. (2014). Consumption and labor supply with partial insurance: An analytical framework. *American Economic Review*, 104(7):2075–2126.

Horowitz, J. L. (2001). The Bootstrap. In Heckman, J. and Leamer, E., editors, *Handbook of Econometrics*, volume 5 of *Handbook of Econometrics*, pages 3159 – 3228. Elsevier.

Hyslop, D. R. (2001). Rising U.S. earnings inequality and family labor supply: The covariance structure of intrafamily earnings. *American Economic Review*, 91(4):755–777.

Kocherlakota, N. R. (1996). Implications of Efficient Risk Sharing without Commitment. *Review of Economic Studies*, 63(4):595–609.

Krueger, D. and Perri, F. (2006). Does income inequality lead to consumption inequality? Evidence and theory. *Review of Economic Studies*, 73(1):163–193.

Ligon, E., Thomas, J. P., and Worrall, T. (2002). Informal insurance arrangements with limited commitment: Theory and evidence from village economies. *Review of Economic Studies*, 69(1):209–244.

Lise, J. and Yamada, K. (2018). Household sharing and commitment: Evidence from panel data on individual expenditures and time use. *Review of Economic Studies*, pages 1–36.

Lundberg, S. J., Pollak, R. A., and Wales, T. J. (1997). Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. *Journal of Human Resources*, 32(3):463.

Lyssiotou, P. (2017). The impact of targeting policy on spouses' demand for public goods, labor supplies and sharing rule. *Empirical Economics*, 53(2):853–878.

Manser, M. and Brown, M. (1980). Marriage and household decision-making: A bargaining analysis. *International Economic Review*, 21(1):31.

Marcet, A. and Marimon, R. (2019). Recursive contracts. *Econometrica*, 87(5):1589–1631.

Mazzocco, M. (2007). Household intertemporal behaviour: A collective characterization and a test of commitment. *Review of Economic Studies*, 74(3):857–895.

Mazzocco, M., Ruiz, C., and Yamaguchi, S. (2014). Labor Supply, Wealth Dynamics and Marriage Decisions. 2014 meeting papers, Society for Economic Dynamics.

McElroy, M. B. and Horney, M. J. (1981). Nash-bargained household decisions: Toward a generalization of the theory of demand. *International Economic Review*, 22(2):333.

Meghir, C. and Pistaferri, L. (2004). Income variance dynamics and heterogeneity. *Econometrica*, 72(1):1–32.

Postel-Vinay, F. and Turon, H. (2010). On-the-job search, productivity shocks, and the individual earnings process. *International Economic Review*, 51(3):599–629.

Rapoport, B., Sofer, C., and Solaz, A. (2011). Household production in a collective model: some new results. *Journal of Population Economics*, 24(1):23–45.

Scholz, J. K., Seshadri, A., and Khitatrakun, S. (2006). Are Americans saving optimally for retirement? *Journal of Political Economy*, 114(4):607–1643.

Sevilla, A., Gimenez-Nadal, J. I., and Gershuny, J. (2012). Leisure inequality in the United States: 1965-2003. *Demography*, 49(3):939–964.

Thomas, D. (1990). Intra-household resource allocation: An inferential approach. *Journal of Human Resources*, 25(4):635.

Townsend, R. M. (1994). Risk and insurance in village India. *Econometrica*, 62(3):539–591.

Ulph, D. T. (1988). A general non-cooperative Nash model of household consumption behaviour. *Working Paper Univ. Bristol*.

Voena, A. (2015). Yours, mine, and ours: Do divorce laws affect the intertemporal behavior of married couples? *American Economic Review*, 105(8):2295–2332.

Ward-Batts, J. (2008). Out of the wallet and into the purse using micro data to test income pooling. *Journal of Human Resources*, 43(2):325–351.

Woolley, F. (1988). A non-cooperative model of family decision making. *Working Paper no. 125. London School Econ.*

Appendices

A Specification appendix

Throughout this study, we estimate different versions of equations (7)-(8) for couples and (9) for singles. Our most general specification for hours of a married male (i.e. column 5, Table 4) is:

$$
\begin{aligned}
\Delta h_{1t} = \alpha_1 &+ \beta_1^1 \widehat{y}_{1t} \Delta h_{1t} + \beta_1^2 \widehat{y}_{2t} \Delta h_{1t} + \gamma_1^1 \widehat{y}_{1t} \Delta h_{2t} + \gamma_1^2 \widehat{y}_{2t} \Delta h_{2t} && \text{(A.1)} \\
&+ \delta_1^1 \widehat{y}_{1t} + \delta_1^2 \widehat{y}_{2t} + \sum_i \left(\zeta_1^{1i} \widehat{y}_{1t} \widehat{h}_{it} + \zeta_1^{2i} \widehat{y}_{2t} \widehat{h}_{it} \right) && \text{(A.2)} \\
&+ \eta_1^1 \widehat{y}_{1t-1} + \eta_1^2 \widehat{y}_{2t-1} + \sum_i \left(\vartheta_1^{1i} \widehat{y}_{1t-1} \widehat{h}_{it} + \vartheta_1^{2i} \widehat{y}_{2t-1} \widehat{h}_{it} \right) && \text{(A.3)} \\
&+ \kappa_1^1 \widehat{y}_{1t-2} + \kappa_1^2 \widehat{y}_{2t-2} + \sum_i \left(\lambda_1^{1i} \widehat{y}_{1t-2} \widehat{h}_{it} + \lambda_1^{2i} \widehat{y}_{2t-2} \widehat{h}_{it} \right) && \text{(A.4)} \\
&+ \sum_i d_{\{h_{it-1}\}} h_{it-1} + \sum_i d_{\{h_{it-2}\}} h_{it-2} && \text{(A.5)} \\
&+ d_{\{y_t\}} y_t + d_{\{y_{t-1}\}} y_{t-1} + d_{\{y_{t-2}\}} y_{t-2} && \text{(A.6)} \\
&+ d_{\{\Delta A_t\}} \Delta A_t + d_{\{A_{t-1}\}} A_{t-1} + d_{\{A_{t-2}\}} A_{t-2} && \text{(A.7)} \\
&+ d_{\{\Delta h_{2t}\}} \Delta h_{2t} + d_{\{\Delta c_t\}} \Delta c_t + d_{\{c_{t-1}\}} c_{t-1} && \text{(A.8)} \\
&+ d_{\{\mathbb{E}_t Y_{1t+1}\}} \mathbb{E}_t Y_{1t+1} + d_{\{\mathbb{E}_t Y_{2t+1}\}} \mathbb{E}_t Y_{2t+1} && \text{(A.9)} \\
&+ \text{quadratic terms couple} \\
&+ \text{demographic controls male},
\end{aligned}
$$

where $\widehat{y}_{jt}$ is the earnings shock, h_{jt-1} and h_{jt-2} are the first and second lags of log hours, y_t is log household earnings, A_t is household wealth, c_t is log household consumption, and $\mathbb{E}_t Y_{jt+1}$ is expected future earnings. We keep wealth in levels as we do not want to drop a few households whose wealth is zero or negative. Recasting wealth to logs (and, consequently, dropping the said observations) does not change our results. In all other specifications, we estimate simpler versions of this equation. For example, in replicating Mazzocco's (2007) test for full commitment (i.e. column 1, Table 4), we remove all the terms pertaining to past shocks.

The terms in the equation capture the following effects: (A.1) cross-sectional variation in intrahousehold bargaining power; (A.2) substitution and bargaining effects of current shocks; (A.3) bargaining effects of past shocks; (A.4) bargaining effects of older shocks; (A.5) controls for past hours: hours mean reversion & isolation of wage part of earnings shock; (A.6) controls for household income: income effects of shocks; (A.7) controls for household wealth: wealth effects of shocks; (A.8) controls for partner's hours & household consumption; complementarities; (A.9) controls for expected future path of earnings: effects from continuation value.

The quadratic terms are: $\widehat{h}^2_{jt} - \widehat{h}^2_{jt-1}$, $\widehat{h}_{1t}\widehat{h}_{2t} - \widehat{h}_{1t-1}\widehat{h}_{2t-1}$, $\widehat{y}^2_{jt}$, $\widehat{y}_{1t}\widehat{y}_{2t}$, $\widehat{y}^2_{jt-1}$, $\widehat{y}_{1t-1}\widehat{y}_{2t-1}$, $\widehat{y}^2_{jt-2}$, and $\widehat{y}_{1t-2}\widehat{y}_{2t-2}$, with $j = \{1, 2\}$.

The male demographic controls are age_{1t}, age^2_{1t}, $\mathbb{1}[educ_1 = k]$, $\mathbb{1}[race_1 = \ell]$, $\mathbb{1}[region_t = r]$, $\mathbb{1}[\#fam.members_t = l]$, and $\mathbb{1}[\#children_t = m]$, where $\mathbb{1}$ is the indicator function that equals 1 if the statement in the brackets is true and 0 otherwise. $educ_1$ takes $k = 2$ values for 'high school' and 'at least some college' (excluded category is 'less than high school'); $race_1$ takes $\ell = 2$ values for 'black' and 'white' ('non-black, non-white' is excluded); $region_t$ takes $r = 3$ values for 'Northeast', 'South', 'West' ('Midwest' is excluded); $\#fam.members_t$ is the number of family members, and $\#children_t$ is the number of children present in the household at time t.

The equation for hours of a married female (i.e. column 6, Table 4) is analogous except the female demographic controls; these are age_{2t}, age^2_{2t}, $\mathbb{1}[educ_2 = k]$, $\mathbb{1}[race_2 = \ell]$, $\mathbb{1}[region_t = r]$, $\mathbb{1}[\#fam.members_t = l]$, $\mathbb{1}[\#children_t = m]$, $age_{ch;t}$ and $age^2_{ch;t}$, where $age_{ch;t}$ is the age of the couple's youngest child. There is ample evidence that the age of children matters for parental labor supply, for example through the time parents need to invest in childcare (e.g. Giménez-Nadal and Molina, 2016; Campaña et al., 2017); we find that in the PSID this matters primarily for mothers. The dummy variables are over the same groups as in the case of men above.

In both equations, we assume that all right-hand side variables are exogenous, except those that involve current hours. We use each equation's exogenous right-hand side variables and a common additional set of variables as instruments. This additional set includes age_{jt}, age^2_{jt}, $\mathbb{1}[educ_j = k]$, $\mathbb{1}[race_j = \ell]$, $\mathbb{1}[region_t = r]$, $\mathbb{1}[\#fam.members_{t-\tau} = l]$, $\mathbb{1}[\#children_{t-\tau} = m]$, $age_{ch;t}$, $age^2_{ch;t}$, $exper_{jt}$, $exper^2_{jt}$, $\mathbb{1}[other\ income_{t-\tau} = \text{yes}]$, and $\mathbb{1}[children\ outside\ household_{t-\tau} = \text{yes}]$ for both spouses in the couple. $exper_{jt}$ is the potential job market experience of spouse j at time t (defined as current age minus years of schooling), *other income* reflects the presence of income recipients other than the spouses in the household, and *children outside household* captures the presence of dependent children not residing in the household. Where applicable, our instruments are for up to two lags of time, i.e. $\tau = \{0, 1, 2\}$.

In a robustness check in Appendix Tables C.9-C.10, we expand the set of instruments to also include individual historical earnings and hours in period $t - 3$, i.e. y_{jt-3} and h_{jt-3} for $j = \{1, 2\}$. We do not use these instruments in the baseline as they require a fourth consecutive period of data, thus reducing the size of our sample.

Our estimating equation for singles is analogous, namely:

$$\begin{aligned}\Delta h_{jt} = \widetilde{\alpha}_j &+ \widetilde{\beta}_j \widehat{y}_{jt} \Delta h_{jt} + \widetilde{\delta}_j \widehat{y}_{jt} + \widetilde{\zeta}_j \widehat{y}_{jt} \widehat{h}_{jt} \\ &+ \widetilde{\eta}_j \widehat{y}_{jt-1} + \widetilde{\vartheta}_j \widehat{y}_{jt-1} \widehat{h}_{jt} + \widetilde{\kappa}_j \widehat{y}_{jt-2} + \widetilde{\lambda}_j \widehat{y}_{jt-2} \widehat{h}_{jt} \\ &+ \widetilde{d}_{\{h_{jt-1}\}} h_{jt-1} + \widetilde{d}_{\{h_{jt-2}\}} h_{jt-2}\end{aligned}$$

$$
\begin{aligned}
&+ \widetilde{d}_{\{y_{jt}\}} y_{jt} + \widetilde{d}_{\{y_{jt-1}\}} y_{jt-1} + \widetilde{d}_{\{y_{jt-2}\}} y_{jt-2} \\
&+ \widetilde{d}_{\{\Delta A_{jt}\}} \Delta A_{jt} + \widetilde{d}_{\{A_{jt-1}\}} A_{jt-1} + \widetilde{d}_{\{A_{jt-2}\}} A_{jt-2} \\
&+ \widetilde{d}_{\{\Delta c_{jt}\}} \Delta c_{jt} + \widetilde{d}_{\{c_{jt-1}\}} c_{jt-1} \\
&+ \widetilde{d}_{\{\mathbb{E}_t Y_{jt+1}\}} \mathbb{E}_t Y_{jt+1} \\
&+ \text{quadratic terms single} \\
&+ \text{demographic controls male/female},
\end{aligned}
$$

where the quadratic terms are $\widehat{h}_{jt}^2 - \widehat{h}_{jt-1}^2$, $\widehat{y}_{jt}^2$, $\widehat{y}_{jt-1}^2$, $\widehat{y}_{jt-2}^2$ while the demographic controls are similar to those for married men and women respectively. Household level variables (e.g. earnings, wealth, consumption) are now subscripted by j to reflect assignability. The equation controls for both individual earnings and earnings shocks, thus it controls for the entire profile of earnings over periods t, $t-1$, and $t-2$. We use an analogous set of instruments as in the case of couples.

B Data appendix

This appendix describes the main variables we use in our empirical test. The left-hand side variable in equations (7)-(8) for couples, and (9) for singles, is hours growth. The right-hand side variables include earnings, consumption, wealth, and an array of demographics. See Appendix A for the full set of variables included in the estimating equations.

1. Labor market hours. These are the total annual work hours on all jobs including overtime. We extract this information from PSID variables `ER16471-ER16482` in 1999, and its counterparts in the following years.

2. Labor market earnings. Earnings are the sum of several annual labor income components (such as salaries, bonuses, overtime, tips) from all jobs, before tax is deducted. We extract this information from PSID variables `ER16463-ER16465` in 1999 and its later counterparts.

3. Family income. We had two choices in designing this variable: either add up spousal labor market earnings, or use a standalone variable provided by the PSID that aggregates labor market earnings in the household, and adds transfer income of each spouse (e.g. social security income) and earnings and transfer income of other family members. We opted for the second approach; we use PSID variable `ER16462` in 1999 and its later counterparts.

4. Consumption. This is annual household expenditure on nondurable goods: food (PSID variable `ER16515A1` in 1999), transportation (variable `ER16515B6`), education and schooling (variable `ER16515C9`), and childcare (variable `ER16515D1`). The PSID includes additional consumption categories, e.g. rent, utilities, and health expenditure. We do not use those as they require additional assumptions such as, for example, assumptions to deduce the rent equivalent of home owners. Consumption is anyway of secondary interest in our test, given that it is not assignable.

5. Wealth. Household wealth comprises home equity and several categories of assets (value of farm, business and vehicles; savings; stocks; annuities and retirement accounts; real estate), net of student, medical, legal and other debt. We extract this information from PSID variable `S417` in 1999 and its later counterparts.

6. Job market experience. We construct this as individual age (variable `ER33504` in 1999) minus six and the number of years one has stayed in school (variables `ER16516-ER16517` in 1999). The maximum recorded number of years at school is 17, so individuals who have stayed in graduate school for longer have their labor market experience overestimated. We use job market experience as part of our set of instruments.

All other variables are standard demographics that we extract directly from the data.

C Results appendix

This appendix presents additional results and a number of robustness checks on our main findings. In all following tables we show the most important parameters, namely those that pertain to the effects of current and past shocks as well as selected controls for past hours, family income, and family wealth. Our estimating equations include several other right-hand side regressors (see Appendix A for details) but we do not show those for the sake of brevity. All our results are available upon request.

Tables C.1-C.2 accompany the linear specification Tables 2-3 in the main text and show additional coefficients. Tables C.3-C.4 accompany the quadratic specification Tables 4-5 in the main text and also show additional coefficients. All other tables are for the quadratic version of our estimating equations.

Tables C.5-C.6 present results using a flexible earnings process with individual specific slope coefficient $\psi_{j,1}$. Tables C.7-C.8 present results using a log earnings process with slope coefficient $\psi_{j,1}$ marital status and education specific. The remaining results use the baseline earnings process in levels with $\psi_{j,1}$ marital status and education specific. Tables C.9-C.10 use the expanded set of instruments that include the partner's and own earnings and hours in period $t-3$. Given the requirement of an additional period of data, the sample sizes in these tables are slightly smaller than those reported elsewhere. Finally, Tables C.11-C.12 show results from a GMM weighting scheme that accounts for arbitrary correlation among observations within households. We calculate the standard errors using the block bootstrap.

We repeat everything excluding expected earnings at $t+1$ from the right-hand side of our estimating equations as well as, separately, using a quadratic earnings process in age. These results do not show any meaningful differences from the rest, so we do not show them here. All our detailed results are available upon request.

Table C.1: Married Couples, Linear Test for Commitment - Additional Results

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.583***	-0.885	-0.255***	-1.808***	-0.224***	-1.888***
	(0.039)	(0.699)	(0.035)	(0.648)	(0.037)	(0.647)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.656	-0.922***	-0.404	-0.131	-0.332	-0.075
	(0.674)	(0.092)	(0.545)	(0.080)	(0.545)	(0.071)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.080***	-0.175**	0.130***	-0.354***	0.134***	-0.362***
	(0.016)	(0.073)	(0.013)	(0.098)	(0.013)	(0.093)
$\widehat{y}_{2t}$	-0.165***	0.413***	-0.302***	0.589***	-0.271***	0.578***
	(0.059)	(0.052)	(0.071)	(0.056)	(0.074)	(0.057)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.082***	0.265***	-0.082***	0.265***
			(0.013)	(0.062)	(0.012)	(0.063)
$\widehat{y}_{2t-1}$			0.103***	-0.216***	0.082***	-0.195***
			(0.032)	(0.039)	(0.031)	(0.039)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.021	0.033**
					(0.017)	(0.014)
$\widehat{y}_{2t-2}$					0.044	-0.102***
					(0.029)	(0.030)
E. Selected other controls:						
past hours h_{1t-1}			-0.578***	0.440***	-0.637***	0.466***
			(0.011)	(0.126)	(0.011)	(0.137)
past hours h_{2t-1}			0.143***	-0.541***	0.140***	-0.613***
			(0.040)	(0.010)	(0.049)	(0.011)
family income y_t			0.141***	0.080*	0.141***	0.095**
			(0.023)	(0.044)	(0.023)	(0.044)
family income y_{t-1}			-0.020	-0.206***	-0.028	-0.184***
			(0.021)	(0.047)	(0.021)	(0.048)
wealth Δa_t $(\times 1e-5)$			0.001***	-0.002***	0.001**	-0.002***
			(0.000)	(0.001)	(0.000)	(0.001)
wealth a_{t-1} $(\times 1e-5)$			-0.001	-0.000	-0.001**	0.000
			(0.000)	(0.001)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	10,209		10,209		10,209	

Notes: The table accompanies main text Table 2. The specification includes a constant. Columns (1)-(2) include terms for: the cross-product of current own (partner's) shock and partner's (own) hours; all products between current own/partner's shock and own/partner's deviation of hours from the expected value; the partner's hours growth; consumption growth and the first lag of consumption; expected future earnings of either spouse; own age (and its square); dummies for own education, own race, region of residence, number of adult family members, and number of children in the household; and, in the case of women, the age (and its square) of the family's youngest child. Columns (3)-(4) additionally include terms for all products between period $t-1$ own/partner's shock and own/partner's deviation of hours from the expected value. Columns (5)-(6) add terms for: all products between period $t-2$ own/partner's shock and own/partner's deviation of hours from the expected value; and spousal hours, family income, and wealth at $t-2$. See Appendix A for the full list of instruments. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.2: Singles, Linear Test for 'Commitment' - Additional Results

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	0.070		-0.017		-0.025	
	(0.044)		(0.034)		(0.034)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-1.059***		-1.053***		-1.227***
		(0.078)		(0.074)		(0.085)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	-0.047		-0.226***		-0.208***	
	(0.034)		(0.028)		(0.029)	
$\widehat{y}_{2t}$		0.179***		0.115***		0.067
		(0.051)		(0.043)		(0.044)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			0.154***		0.161***	
			(0.036)		(0.036)	
$\widehat{y}_{2t-1}$				0.213***		0.118***
				(0.042)		(0.043)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					0.026	
					(0.039)	
$\widehat{y}_{2t-2}$						0.107***
						(0.038)
E. Selected other controls:						
past hours h_{1t-1}			-0.650***		-0.708***	
			(0.019)		(0.021)	
past hours h_{2t-1}				-0.658***		-0.706***
				(0.014)		(0.015)
income y_t			0.381***	0.285***	0.375***	0.299***
			(0.018)	(0.017)	(0.018)	(0.016)
income y_{t-1}			-0.131***	-0.259***	-0.117***	-0.200***
			(0.021)	(0.017)	(0.022)	(0.018)
wealth Δa_t $(\times 1e-5)$			0.001	-0.002***	0.000	-0.002***
			(0.002)	(0.001)	(0.002)	(0.001)
wealth a_{t-1} $(\times 1e-5)$			0.002	-0.003***	-0.000	-0.003***
			(0.002)	(0.001)	(0.002)	(0.001)
Obs. [hhs × Δyear]	2,318	3,766	2,318	3,766	2,318	3,766

Notes: The table accompanies main text Table 3. The specification includes a constant. Columns (1)-(2) include terms for: the product of current shock and the deviation of hours from the expected value; consumption growth and the first lag of consumption; expected future earnings; age (and its square); dummies for education, race, region of residence, number of adult family members, and number of children in the household; and, in the case of women, the age (and its square) of the youngest child. Columns (3)-(4) additionally include terms for the product between the period $t-1$ shock and the deviation of hours from the expected value. Columns (5)-(6) add terms for the product between the period $t-2$ shock and the deviation of hours from the expected value; and hours, family income, and wealth at $t-2$. See Appendix A for the full list of instruments. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.3: Married Couples, Quadratic Test for Commitment - Additional Results

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.048	-0.800	0.054	-0.796	0.103**	-1.280**
	(0.036)	(0.586)	(0.034)	(0.525)	(0.050)	(0.573)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.158	-0.242***	0.116	0.076	0.033	0.093
	(0.542)	(0.078)	(0.490)	(0.067)	(0.478)	(0.064)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.102***	-0.126*	0.129***	-0.208**	0.130***	-0.291***
	(0.024)	(0.069)	(0.042)	(0.093)	(0.046)	(0.103)
$\widehat{y}^2_{1t}$ $(\times 1e-5)$	-0.005	0.002	-0.003	0.004***	-0.003	0.006***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.004)	(0.002)
$\widehat{y}_{2t}$	0.015	0.312***	-0.067	0.460***	-0.091	0.400***
	(0.050)	(0.051)	(0.066)	(0.056)	(0.066)	(0.064)
$\widehat{y}^2_{2t}$ $(\times 1e-5)$	-0.008	-0.172***	0.036	-0.147***	0.033	-0.166***
	(0.025)	(0.055)	(0.023)	(0.044)	(0.023)	(0.046)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.058***	0.137***	-0.083***	0.250***
			(0.015)	(0.052)	(0.017)	(0.073)
$\widehat{y}^2_{1t-1}$ $(\times 1e-5)$			0.001	-0.001	0.002	-0.006**
			(0.003)	(0.001)	(0.004)	(0.002)
$\widehat{y}_{2t-1}$			-0.018	-0.265***	-0.016	-0.212***
			(0.048)	(0.037)	(0.047)	(0.045)
$\widehat{y}^2_{2t-1}$ $(\times 1e-5)$			0.017	0.063***	0.010	0.058***
			(0.018)	(0.018)	(0.019)	(0.022)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.013*	0.024*
					(0.007)	(0.013)
$\widehat{y}^2_{1t-2}$ $(\times 1e-5)$					-0.003***	0.010***
					(0.001)	(0.003)
$\widehat{y}_{2t-2}$					0.051	-0.086**
					(0.031)	(0.035)
$\widehat{y}^2_{2t-2}$ $(\times 1e-5)$					0.006	-0.001
					(0.016)	(0.023)
E. Selected other controls:						
past hours h_{1t-1}			-0.359***	0.135	-0.393***	0.141
			(0.014)	(0.106)	(0.017)	(0.128)
past hours h_{2t-1}			0.017	-0.295***	0.044	-0.346***
			(0.041)	(0.010)	(0.048)	(0.011)
family income y_t			0.094***	0.107***	0.086***	0.171***
			(0.022)	(0.040)	(0.024)	(0.052)
family income y_{t-1}			-0.023	-0.161***	-0.006	-0.211***
			(0.025)	(0.042)	(0.023)	(0.053)
wealth Δa_t $(\times 1e-5)$			0.000	-0.001**	0.000	-0.000
			(0.000)	(0.000)	(0.001)	(0.001)
wealth a_{t-1} $(\times 1e-5)$			-0.000	-0.001	-0.000	-0.000
			(0.000)	(0.000)	(0.001)	(0.001)
Obs. [hhs × Δyear]	10,209		10,209		10,209	

Notes: The table accompanies main text Table 4. The specification includes all controls mentioned in the notes of Table C.1, and: growth in hours squared of each spouse, growth in the product of hours between spouses, and the spouses' product of current and, depending on the column, past shocks. See Appendix A for the full list of instruments. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.4: Singles, Quadratic Test for 'Commitment' - Additional Results

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.006		-0.025		-0.032	
	(0.029)		(0.025)		(0.025)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-0.132***		0.193***		0.130*
		(0.051)		(0.069)		(0.071)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.202***		0.170***		0.159***	
	(0.030)		(0.031)		(0.032)	
$\widehat{y}^2_{1t}$ ($\times 1e-5$)	-0.012***		-0.027***		-0.023***	
	(0.002)		(0.005)		(0.006)	
$\widehat{y}_{2t}$		0.326***		0.504***		0.469***
		(0.033)		(0.039)		(0.042)
$\widehat{y}^2_{2t}$ ($\times 1e-5$)		0.062***		-0.012		0.028
		(0.012)		(0.023)		(0.033)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.103***		-0.105***	
			(0.032)		(0.034)	
$\widehat{y}^2_{1t-1}$ ($\times 1e-5$)			0.016		0.023	
			(0.016)		(0.017)	
$\widehat{y}_{2t-1}$				-0.371***		-0.368***
				(0.042)		(0.044)
$\widehat{y}^2_{2t-1}$ ($\times 1e-5$)				0.107***		0.096***
				(0.013)		(0.014)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.019	
					(0.031)	
$\widehat{y}^2_{1t-2}$ ($\times 1e-5$)					-0.026	
					(0.017)	
$\widehat{y}_{2t-2}$						-0.045
						(0.038)
$\widehat{y}^2_{2t-2}$ ($\times 1e-5$)						0.004
						(0.011)
E. Selected other controls:						
past hours h_{1t-1}			-0.394***		-0.430***	
			(0.015)		(0.016)	
past hours h_{2t-1}				-0.347***		-0.376***
				(0.012)		(0.013)
income y_t			0.115***	0.085***	0.118***	0.095***
			(0.015)	(0.013)	(0.015)	(0.013)
income y_{t-1}			-0.045***	-0.047***	-0.036**	-0.033**
			(0.016)	(0.013)	(0.016)	(0.015)
wealth Δa_t ($\times 1e-5$)			0.001	-0.000	0.001	-0.000
			(0.001)	(0.000)	(0.001)	(0.000)
wealth a_{t-1} ($\times 1e-5$)			0.001	-0.001**	0.000	-0.002***
			(0.001)	(0.001)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	2,318	3,766	2,318	3,766	2,318	3.766

Notes: The table accompanies main text Table 5. The specification includes all controls mentioned in the notes of Table C.2 and growth in hours squared. See Appendix A for the full list of instruments. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.5: Married Couples, Quadratic Test for Commitment - Flexible Earnings Shock

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.037	-0.956	-0.145***	-1.629*	-0.169***	-1.480*
	(0.038)	(0.859)	(0.037)	(0.909)	(0.043)	(0.866)
$\widehat{y}_{2t} \times \Delta h_{2t}$	0.379	0.045	0.304	0.109	0.460	0.106
	(0.582)	(0.087)	(0.576)	(0.080)	(0.569)	(0.074)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.088***	-0.130	0.065***	-0.249**	0.066***	-0.212**
	(0.016)	(0.095)	(0.016)	(0.104)	(0.020)	(0.092)
$\widehat{y}^2_{1t}$ ($\times 1e-5$)	-0.002	0.000	-0.003***	0.001	-0.004**	-0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
$\widehat{y}_{2t}$	0.137**	0.463***	0.001	0.422***	0.034	0.434***
	(0.062)	(0.048)	(0.068)	(0.060)	(0.065)	(0.056)
$\widehat{y}^2_{2t}$ ($\times 1e-5$)	-0.017	-0.073**	0.009	-0.120***	-0.002	-0.117***
	(0.032)	(0.031)	(0.038)	(0.028)	(0.035)	(0.026)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.050***	0.177***	-0.081***	0.150**
			(0.013)	(0.057)	(0.027)	(0.060)
$\widehat{y}^2_{1t-1}$ ($\times 1e-5$)			0.003	-0.000	0.008	0.001
			(0.007)	(0.003)	(0.011)	(0.003)
$\widehat{y}_{2t-1}$			-0.011	-0.253***	-0.025	-0.261***
			(0.036)	(0.040)	(0.038)	(0.042)
$\widehat{y}^2_{2t-1}$ ($\times 1e-5$)			0.020	0.137***	0.021	0.142***
			(0.023)	(0.025)	(0.027)	(0.025)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					0.006	0.068***
					(0.021)	(0.025)
$\widehat{y}^2_{1t-2}$ ($\times 1e-5$)					-0.006	-0.002
					(0.007)	(0.003)
$\widehat{y}_{2t-2}$					0.068**	-0.000
					(0.027)	(0.045)
$\widehat{y}^2_{2t-2}$ ($\times 1e-5$)					-0.001	-0.034
					(0.023)	(0.029)
E. Selected other controls:						
past hours h_{1t-1}			-0.315***	-0.026	-0.353***	-0.047
			(0.014)	(0.083)	(0.018)	(0.091)
past hours h_{2t-1}			-0.014	-0.252***	-0.030	-0.291***
			(0.029)	(0.010)	(0.031)	(0.011)
family income y_t			0.118***	0.144***	0.120***	0.142***
			(0.019)	(0.044)	(0.017)	(0.040)
family income y_{t-1}			-0.058***	-0.201***	-0.024	-0.159***
			(0.017)	(0.043)	(0.022)	(0.044)
wealth Δa_t ($\times 1e-5$)			-0.000	-0.000	-0.000	-0.000
			(0.000)	(0.001)	(0.001)	(0.001)
wealth a_{t-1} ($\times 1e-5$)			-0.001	0.001	-0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	10,209		10,209		10,209	

Notes: The table reports selected coefficients from the quadratic test for commitment on married couples. Results are for the flexible earnings shock with ψ_{j1} individual specific. See notes in Appendix Tables C.1 and C.3. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.6: Singles, Quadratic Test for 'Commitment' - Flexible Earnings Shock

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	0.005		-0.084**		-0.091***	
	(0.036)		(0.034)		(0.034)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		0.011		0.068		0.164*
		(0.100)		(0.091)		(0.092)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.227***		0.073**		0.049	
	(0.036)		(0.035)		(0.037)	
$\widehat{y}^2_{1t}$ $(\times 1e-5)$	-0.029		0.020		0.022	
	(0.021)		(0.024)		(0.025)	
$\widehat{y}_{2t}$		0.527***		0.461***		0.471***
		(0.045)		(0.048)		(0.050)
$\widehat{y}^2_{2t}$ $(\times 1e-5)$		0.125***		-0.035		-0.185**
		(0.031)		(0.068)		(0.073)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.052*		-0.060*	
			(0.030)		(0.033)	
$\widehat{y}^2_{1t-1}$ $(\times 1e-5)$			-0.034***		-0.033***	
			(0.008)		(0.008)	
$\widehat{y}_{2t-1}$				-0.182***		-0.372***
				(0.038)		(0.049)
$\widehat{y}^2_{2t-1}$ $(\times 1e-5)$				0.072***		0.159***
				(0.013)		(0.023)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.070*	
					(0.037)	
$\widehat{y}^2_{1t-2}$ $(\times 1e-5)$					0.005	
					(0.021)	
$\widehat{y}_{2t-2}$						-0.012
						(0.048)
$\widehat{y}^2_{2t-2}$ $(\times 1e-5)$						-0.043***
						(0.013)
E. Selected other controls:						
past hours h_{1t-1}			-0.347***		-0.391***	
			(0.015)		(0.016)	
past hours h_{2t-1}				-0.322***		-0.331***
				(0.012)		(0.013)
income y_t			0.135***	0.095***	0.138***	0.092***
			(0.015)	(0.013)	(0.015)	(0.013)
income y_{t-1}			-0.075***	-0.085***	-0.062***	-0.045***
			(0.015)	(0.013)	(0.016)	(0.015)
wealth Δa_t $(\times 1e-5)$			0.001	-0.001*	0.000	-0.001*
			(0.001)	(0.000)	(0.001)	(0.000)
wealth a_{t-1} $(\times 1e-5)$			0.000	-0.002***	-0.001	-0.002***
			(0.001)	(0.001)	(0.002)	(0.001)
Obs. [hhs $\times$ Δyear]	2,318	3,766	2,318	3,766	2,318	3.766

Notes: The table reports selected coefficients from the quadratic test for commitment on singles. Results are for the flexible earnings shock with ψ_{j1} individual specific. See notes in Appendix Tables C.2 and C.4. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.7: Married Couples, Quadratic Test for Commitment - Log Earnings Shock

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.022	-0.098	-0.000	-0.168	-0.001	-0.189
	(0.016)	(0.194)	(0.010)	(0.254)	(0.010)	(0.212)
$\widehat{y}_{2t} \times \Delta h_{2t}$	0.039	-0.058***	0.009	0.017	0.003	-0.018
	(0.077)	(0.016)	(0.101)	(0.043)	(0.104)	(0.035)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.129***	0.063*	0.200***	0.004	0.202***	0.006
	(0.010)	(0.037)	(0.014)	(0.076)	(0.015)	(0.071)
$\widehat{y}^2_{1t}$ ($\times 1e-5$)	0.018***	0.001	0.052***	-0.039	0.054***	-0.035
	(0.006)	(0.014)	(0.005)	(0.026)	(0.005)	(0.024)
$\widehat{y}_{2t}$	0.047*	0.232***	0.046	0.251***	0.057	0.282***
	(0.026)	(0.012)	(0.046)	(0.041)	(0.048)	(0.035)
$\widehat{y}^2_{2t}$ ($\times 1e-5$)	-0.017	-0.019*	-0.011	0.061***	-0.005	0.073***
	(0.024)	(0.010)	(0.024)	(0.018)	(0.026)	(0.014)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.098***	0.056	-0.082***	0.037
			(0.010)	(0.045)	(0.010)	(0.035)
$\widehat{y}^2_{1t-1}$ ($\times 1e-5$)			-0.024***	-0.028**	-0.019***	-0.024**
			(0.003)	(0.012)	(0.003)	(0.010)
$\widehat{y}_{2t-1}$			-0.019	-0.099***	-0.024	-0.108***
			(0.032)	(0.033)	(0.031)	(0.025)
$\widehat{y}^2_{2t-1}$ ($\times 1e-5$)			-0.022*	-0.035***	-0.022*	-0.039***
			(0.012)	(0.011)	(0.012)	(0.009)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.051***	0.038
					(0.009)	(0.026)
$\widehat{y}^2_{1t-2}$ ($\times 1e-5$)					-0.007**	0.005
					(0.003)	(0.006)
$\widehat{y}_{2t-2}$					-0.004	-0.065***
					(0.010)	(0.016)
$\widehat{y}^2_{2t-2}$ ($\times 1e-5$)					0.001	-0.006
					(0.004)	(0.004)
E. Selected other controls:						
past hours h_{1t-1}			-0.419***	0.447***	-0.474***	0.436**
			(0.011)	(0.168)	(0.013)	(0.183)
past hours h_{2t-1}			0.029	-0.440***	0.003	-0.476***
			(0.033)	(0.023)	(0.039)	(0.019)
family income y_t			-0.073**	0.152	-0.074**	0.081
			(0.035)	(0.104)	(0.037)	(0.089)
family income y_{t-1}			-0.007	-0.192***	-0.012	-0.134***
			(0.022)	(0.059)	(0.021)	(0.043)
wealth Δa_t ($\times 1e-5$)			0.000	0.000	0.000	-0.000
			(0.000)	(0.001)	(0.000)	(0.000)
wealth a_{t-1} ($\times 1e-5$)			0.000	0.000	-0.000	-0.001
			(0.000)	(0.001)	(0.000)	(0.001)
Obs. [hhs $\times$ Δyear]	10,209		10,209		10,209	

Notes: The table reports selected coefficients from the quadratic test for commitment on married couples. Results are for the shock to log earnings with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.1 and C.3. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.8: Singles, Quadratic Test for 'Commitment' - Log Earnings Shock

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.037**		-0.067***		-0.068***	
	(0.014)		(0.014)		(0.014)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-0.021*		-0.076***		-0.079***
		(0.011)		(0.011)		(0.011)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.205***		0.316***		0.302***	
	(0.017)		(0.020)		(0.020)	
$\widehat{y}^2_{1t}$ $(\times 1e-5)$	0.002		0.056***		0.056***	
	(0.007)		(0.006)		(0.006)	
$\widehat{y}_{2t}$		0.259***		0.365***		0.359***
		(0.013)		(0.014)		(0.014)
$\widehat{y}^2_{2t}$ $(\times 1e-5)$		-0.024**		0.069***		0.073***
		(0.009)		(0.008)		(0.009)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.110***		-0.104***	
			(0.021)		(0.022)	
$\widehat{y}^2_{1t-1}$ $(\times 1e-5)$			-0.031***		-0.026***	
			(0.006)		(0.006)	
$\widehat{y}_{2t-1}$				-0.162***		-0.148***
				(0.016)		(0.017)
$\widehat{y}^2_{2t-1}$ $(\times 1e-5)$				-0.051***		-0.046***
				(0.006)		(0.006)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.027	
					(0.021)	
$\widehat{y}^2_{1t-2}$ $(\times 1e-5)$					-0.004	
					(0.008)	
$\widehat{y}_{2t-2}$						-0.061***
						(0.014)
$\widehat{y}^2_{2t-2}$ $(\times 1e-5)$						-0.004
						(0.007)
E. Selected other controls:						
past hours h_{1t-1}			-0.520***		-0.554***	
			(0.019)		(0.020)	
past hours h_{2t-1}				-0.441***		-0.471***
				(0.014)		(0.015)
income y_t			-0.113***	-0.074***	-0.099***	-0.069***
			(0.019)	(0.013)	(0.019)	(0.013)
income y_{t-1}			-0.019	-0.015	-0.006	-0.014
			(0.019)	(0.014)	(0.021)	(0.015)
wealth Δa_t $(\times 1e-5)$			-0.001	-0.000	-0.002*	-0.000
			(0.001)	(0.000)	(0.001)	(0.000)
wealth a_{t-1} $(\times 1e-5)$			-0.002**	-0.001**	-0.004***	-0.001**
			(0.001)	(0.000)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	2,318	3,766	2,318	3,766	2,318	3.766

Notes: The table reports selected coefficients from the quadratic test for commitment on singles. Results are for the shock to log earnings with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.2 and C.4. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.9: Married Couples, Quadratic Test for Commitment - Additional Instruments

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.137***	0.219	-0.009	0.060	0.078	-0.604
	(0.035)	(0.337)	(0.049)	(0.285)	(0.052)	(0.406)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.269	-0.388***	1.121	-0.081	0.514	-0.100
	(0.449)	(0.072)	(0.757)	(0.061)	(0.573)	(0.069)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.052***	0.036	0.049	-0.018	0.078	-0.118**
	(0.013)	(0.032)	(0.063)	(0.042)	(0.056)	(0.052)
$\widehat{y}^2_{1t}$ $(\times 1e-5)$	-0.001	-0.001	0.004	0.002**	0.000	0.004**
	(0.001)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
$\widehat{y}_{2t}$	0.143***	0.304***	0.251**	0.461***	0.011	0.394***
	(0.043)	(0.034)	(0.108)	(0.034)	(0.089)	(0.045)
$\widehat{y}^2_{2t}$ $(\times 1e-5)$	-0.034	-0.078**	-0.016	-0.140***	0.004	-0.175***
	(0.021)	(0.037)	(0.031)	(0.039)	(0.024)	(0.044)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.065*	0.037	-0.088**	0.126***
			(0.037)	(0.031)	(0.039)	(0.045)
$\widehat{y}^2_{1t-1}$ $(\times 1e-5)$			-0.005	-0.000	-0.002	-0.001
			(0.005)	(0.001)	(0.005)	(0.002)
$\widehat{y}_{2t-1}$			-0.180*	-0.369***	-0.068	-0.297***
			(0.095)	(0.037)	(0.075)	(0.044)
$\widehat{y}^2_{2t-1}$ $(\times 1e-5)$			0.055	0.107***	0.023	0.102***
			(0.037)	(0.016)	(0.029)	(0.018)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					0.001	-0.001
					(0.013)	(0.013)
$\widehat{y}^2_{1t-2}$ $(\times 1e-5)$					-0.005***	0.007**
					(0.002)	(0.003)
$\widehat{y}_{2t-2}$					0.106***	-0.090**
					(0.037)	(0.036)
$\widehat{y}^2_{2t-2}$ $(\times 1e-5)$					0.000	-0.012
					(0.020)	(0.021)
E. Selected other controls:						
past hours h_{1t-1}			-0.323***	-0.012	-0.378***	-0.020
			(0.028)	(0.045)	(0.029)	(0.073)
past hours h_{2t-1}			-0.099***	-0.274***	0.053	-0.345***
			(0.037)	(0.010)	(0.047)	(0.013)
family income y_t			0.082*	0.023	0.085**	0.077*
			(0.046)	(0.031)	(0.039)	(0.043)
family income y_{t-1}			-0.003	-0.050*	0.017	-0.126***
			(0.049)	(0.028)	(0.042)	(0.041)
wealth Δa_t $(\times 1e-5)$			0.001	-0.000	0.000	0.000
			(0.001)	(0.000)	(0.001)	(0.001)
wealth a_{t-1} $(\times 1e-5)$			0.000	-0.000	0.000	-0.001
			(0.001)	(0.000)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	7,366		7,366		7,366	

Notes: The table reports selected coefficients from the quadratic test for commitment on married couples. Results are for the baseline earnings shock with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.1 and C.3. The default set of instruments is expanded to include individual earnings and hours in period $t-3$. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.10: Singles, Quadratic Test for 'Commitment' - Additional Instruments

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.065**		-0.057**		-0.067**	
	(0.033)		(0.029)		(0.030)	
$\widehat{y}_{2t} \times \Delta h_{2t}$		-0.284***		0.031		0.003
		(0.078)		(0.080)		(0.081)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.192***		0.236***		0.232***	
	(0.036)		(0.041)		(0.043)	
$\widehat{y}^2_{1t}$ ($\times 1e-5$)	0.021		-0.033		-0.028	
	(0.022)		(0.022)		(0.024)	
$\widehat{y}_{2t}$		0.332***		0.553***		0.528***
		(0.037)		(0.051)		(0.051)
$\widehat{y}^2_{2t}$ ($\times 1e-5$)		0.021		-0.044		-0.017
		(0.018)		(0.036)		(0.038)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.147***		-0.159***	
			(0.037)		(0.040)	
$\widehat{y}^2_{1t-1}$ ($\times 1e-5$)			0.025		0.039*	
			(0.020)		(0.021)	
$\widehat{y}_{2t-1}$				-0.412***		-0.484***
				(0.051)		(0.058)
$\widehat{y}^2_{2t-1}$ ($\times 1e-5$)				0.118***		0.239***
				(0.036)		(0.054)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					0.000	
					(0.037)	
$\widehat{y}^2_{1t-2}$ ($\times 1e-5$)					-0.026	
					(0.020)	
$\widehat{y}_{2t-2}$						0.052
						(0.052)
$\widehat{y}^2_{2t-2}$ ($\times 1e-5$)						-0.034*
						(0.020)
E. Selected other controls:						
past hours h_{1t-1}			-0.345***		-0.385***	
			(0.018)		(0.020)	
past hours h_{2t-1}				-0.356***		-0.383***
				(0.015)		(0.017)
income y_t			0.097***	0.097***	0.100***	0.102***
			(0.019)	(0.016)	(0.019)	(0.016)
income y_{t-1}			-0.037*	-0.053***	-0.022	-0.022
			(0.020)	(0.017)	(0.022)	(0.019)
wealth Δa_t ($\times 1e-5$)			0.002	-0.000	0.001	-0.001
			(0.001)	(0.000)	(0.002)	(0.000)
wealth a_{t-1} ($\times 1e-5$)			0.001	-0.001*	-0.001	-0.002***
			(0.002)	(0.001)	(0.002)	(0.001)
Obs. [hhs $\times$ Δyear]	1,433	2,540	1,433	2,540	1,433	2,540

Notes: The table reports selected coefficients from the quadratic test for commitment on singles. Results are for the baseline earnings shock with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.2 and C.4. The default set of instruments is expanded to include individual earnings and hours in period $t-3$. Asymptotic standard errors using the optimal weighting matrix are reported in parentheses.

Table C.11: Married Couples, Quadratic Test for Commitment - Block Bootstrap Standard Errors

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{1t}$	-0.067	-0.607	0.097	-0.912	0.122	-1.273**
	(0.070)	(0.542)	(0.080)	(0.577)	(0.088)	(0.541)
$\widehat{y}_{2t} \times \Delta h_{2t}$	-0.073	-0.208	0.190	0.075	0.116	0.117
	(0.369)	(0.142)	(0.376)	(0.118)	(0.375)	(0.122)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.097***	-0.047	0.172***	-0.223**	0.133***	-0.249***
	(0.026)	(0.068)	(0.041)	(0.097)	(0.040)	(0.088)
$\widehat{y}^2_{1t}$ $(\times 1e-5)$	-0.005	0.000	-0.006	0.004	-0.003	0.005
	(0.006)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
$\widehat{y}_{2t}$	0.015	0.288***	-0.055	0.453***	-0.077	0.428***
	(0.057)	(0.052)	(0.082)	(0.072)	(0.080)	(0.073)
$\widehat{y}^2_{2t}$ $(\times 1e-5)$	-0.018	-0.138	0.048	-0.127	0.037	-0.150*
	(0.025)	(0.091)	(0.033)	(0.090)	(0.032)	(0.085)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.089***	0.181***	-0.092***	0.228***
			(0.027)	(0.066)	(0.023)	(0.070)
$\widehat{y}^2_{1t-1}$ $(\times 1e-5)$			0.003	-0.001	0.002	-0.004
			(0.007)	(0.006)	(0.006)	(0.006)
$\widehat{y}_{2t-1}$			-0.024	-0.252***	-0.009	-0.226***
			(0.058)	(0.056)	(0.054)	(0.059)
$\widehat{y}^2_{2t-1}$ $(\times 1e-5)$			0.007	0.075	0.002	0.063
			(0.026)	(0.052)	(0.026)	(0.050)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.016	0.037
					(0.017)	(0.027)
$\widehat{y}^2_{1t-2}$ $(\times 1e-5)$					-0.004*	0.009**
					(0.002)	(0.004)
$\widehat{y}_{2t-2}$					0.050	-0.084*
					(0.031)	(0.047)
$\widehat{y}^2_{2t-2}$ $(\times 1e-5)$					0.001	0.001
					(0.024)	(0.047)
E. Selected other controls:						
past hours h_{1t-1}			-0.373***	0.202	-0.409***	0.194
			(0.021)	(0.133)	(0.025)	(0.149)
past hours h_{2t-1}			0.021	-0.307***	0.030	-0.347***
			(0.051)	(0.019)	(0.058)	(0.021)
family income y_t			0.052*	0.124**	0.072***	0.134***
			(0.027)	(0.051)	(0.026)	(0.049)
family income y_{t-1}			0.008	-0.159***	0.007	-0.174***
			(0.029)	(0.046)	(0.026)	(0.048)
wealth Δa_t $(\times 1e-5)$			-0.000	-0.001	0.000	-0.001
			(0.001)	(0.001)	(0.001)	(0.001)
wealth a_{t-1} $(\times 1e-5)$			-0.000	-0.000	0.000	-0.001
			(0.001)	(0.001)	(0.001)	(0.001)
Obs. [hhs $\times$ Δyear]	10,209		10,209		10,209	

Notes: The table reports selected coefficients from the quadratic test for commitment on married couples. Results are for the baseline earnings shock with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.1 and C.3. The GMM weighting matrix accounts for arbitrary correlation among observations within households. Block bootstrap standard errors are reported in parentheses.

Table C.12: Singles, Quadratic Test for 'Commitment' - Block Bootstrap Standard Errors

	Current shocks		Current shocks and shocks at $t-1$		Current shocks and shocks up to $t-2$	
	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Hours growth Δh_{jt}	$j=1$	$j=2$	$j=1$	$j=2$	$j=1$	$j=2$
A. Cross-sectional variation in bargaining power:						
$\widehat{y}_{1t} \times \Delta h_{jt}$	-0.004		-0.029		-0.031	
	(0.130)		(0.193)		(0.210)	
$\widehat{y}_{2t} \times \Delta h_{jt}$		-0.163		0.165		0.095
		(0.110)		(0.159)		(0.167)
B. Current shocks, period t:						
$\widehat{y}_{1t}$	0.190***		0.183**		0.171**	
	(0.050)		(0.072)		(0.073)	
$\widehat{y}^2_{1t}$ ($\times 1e-5$)	-0.011		-0.028		-0.025	
	(0.036)		(0.046)		(0.051)	
$\widehat{y}_{2t}$		0.321***		0.528***		0.499***
		(0.064)		(0.071)		(0.062)
$\widehat{y}^2_{2t}$ ($\times 1e-5$)		0.068		-0.021		0.020
		(0.097)		(0.091)		(0.125)
C. Past shocks, period $t-1$:						
$\widehat{y}_{1t-1}$			-0.101*		-0.101	
			(0.061)		(0.063)	
$\widehat{y}^2_{1t-1}$ ($\times 1e-5$)			0.017		0.019	
			(0.041)		(0.038)	
$\widehat{y}_{2t-1}$				-0.390***		-0.396***
				(0.056)		(0.061)
$\widehat{y}^2_{2t-1}$ ($\times 1e-5$)				0.114***		0.105**
				(0.043)		(0.049)
D. Past shocks, period $t-2$:						
$\widehat{y}_{1t-2}$					-0.041	
					(0.047)	
$\widehat{y}^2_{1t-2}$ ($\times 1e-5$)					-0.016	
					(0.040)	
$\widehat{y}_{2t-2}$						-0.048
						(0.044)
$\widehat{y}^2_{2t-2}$ ($\times 1e-5$)						0.004
						(0.031)
E. Selected other controls:						
past hours h_{1t-1}			-0.396***		-0.431***	
			(0.036)		(0.034)	
past hours h_{2t-1}				-0.346***		-0.374***
				(0.026)		(0.028)
income y_t			0.109***	0.069***	0.110***	0.073***
			(0.023)	(0.024)	(0.024)	(0.023)
income y_{t-1}			-0.041*	-0.034*	-0.032	-0.018
			(0.024)	(0.021)	(0.025)	(0.022)
wealth Δa_t ($\times 1e-5$)			0.000	-0.000	0.001	-0.000
			(0.002)	(0.002)	(0.002)	(0.002)
wealth a_{t-1} ($\times 1e-5$)			-0.000	-0.001	-0.000	-0.001
			(0.002)	(0.001)	(0.002)	(0.001)
Obs. [hhs $\times$ Δyear]	2,318	3,766	2,318	3,766	2,318	3.766

Notes: The table reports selected coefficients from the quadratic test for commitment on singles. Results are for the baseline earnings shock with ψ_{j1} marital status and education specific. See notes in Appendix Tables C.2 and C.4. The GMM weighting matrix accounts for arbitrary correlation among observations within households. Block bootstrap standard errors are reported in parentheses.