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ABSTRACT

Intertemporal Labor Supply and Intra-Household Commitment*

This paper adopts an intertemporal labor supply perspective to propose a test that allows us to distinguish between intra-household non-commitment, limited commitment, and full commitment. It investigates whether, after controling for current and future (expected) wages, past wage shocks have a lasting and significant impact on present labor supply and public consumption. Using a semi-log parametrization of labor supply and data from the Panel Study of Income Dynamics for the US, the paper shows positive evidence in favor of the limited commitment model. Specifically, unexpected past wage shocks affect labor supply in exactly the way predicted by theory, as spouses' past wage deviations have a negative impact on their labor supply and a positive impact on their spouses'. In addition, wives' past wage shocks also impact negatively household public expenditure on housing.

JEL Classification: D15, J22

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

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1 Introduction

This paper explores intertemporal aspects of household labor supply and intrahousehold commitment, from the perspective of collective models (Chiappori, 1988, 1992). Traditionally, household studies have followed the so-called unitary model, that takes the family as a single decision unit whose preferences can be 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 estimations of intrahousehold inequality.[2] Last but not least, its empirical predictions, in particularly the well-known 'income pooling' property (whereby only total household income matters for household behavior, irrespective of individual members' respective contributions), are typically rejected (Thomas, 1990; Lundberg et al., 1997; Duflo, 2003; Ward-Batts, 2008, etc.).

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 trying to model the decision process through which these preferences interact (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; Woolley, 1988). Chiappori (1988, 1992) then proposed a general framework for analyzing intrahousehold behavior, the collective model, in which individuals are only assumed to reach Pareto-efficient outcomes. Since then, some authors have proposed various extensions of 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 (e.g., Browning et al., 1994; Haddad and Hoddinott, 1994; Lundberg et al., 1997; Browning and Chiappori, 1998; Chiappori et al., 2002; Rapoport et al., 2011; Attanasio and Lechene, 2014; Lyssiotou, 2017; Armand et al., 2016).[3]

The collective models developed in the 1990s and the 2000s were however mostly static. Static models of household behavior have strong limitations. They cannot be used for evaluating policies entailing an intertemporal aspect;

[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 reviews of the literature in Donni and Chiappori (2011); Donni and Molina (2019).

and they essentially 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., 2010). 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 on their future behavior. Clearly, behavioral predictions in a dynamic setting will crucially depend on the assumption made; as a result, the relevance of any policy recommendation will presumably vary with them. To take but one example, an analysis of the long term impact of specific legislations governing divorce cannot ignore the limitations (if any) introduced by the spouse's ability to commit.

In the collective setting, three models of intertemporal household behaviors have emerged to fill this gap: the full intertemporal commitment (FIC) model, the non-commitment (NC) model, and the limited intertemporal commitment (LIC) model. According to NC models, spouses renegotiate Pareto weights every period, regardless of previous exogenous variables, bargaining powers and household decisions. These models thus consist of a series of non-related static models, and only assume *static* Pareto efficiency at each period (ex-post efficiency). The main limitation of NC models is their *dynamic* (ex ante) inefficiency. In a NC context, agents' decisions at each period only depend on current (and future) values of the relevant variables. Such a constraint severely hampers the agents' ability to share risk, and generally to efficiently allocate resources across periods and states of the world. To give just an example, efficient risk sharing typically requires that an agent hit by a negative productivity shock be compensated by other family members; in a NC framework, however, the main impact of the shock is a decrease in the agent's outside options, therefore in his/her bargaining position, resulting in lower welfare.

The opposite scenario is that of the FIC models, according to which household members are able, at the beginning of the relationship, to fully commit on *all* future (possibly state-contingent) allocations. In practice, ex post efficiency requires that household decisions maximize a weighted sum of individual utilities; 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*. Clearly, FIC models typically generate ex-ante efficient allocations, involving in particular full risk sharing between household members. The price to pay for these strong normative properties is in term of realism. FIC models postulate 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 agent remains married despite the fact that his/her welfare would be higher if divorced. How such commitment level could be implemented in practice is unclear.

The LIC framework, proposed by Mazzocco (2004), provides an elegant solution to these problems. LIC models recognize that spouses always have an "outside option", usually associated with divorce and household dissolution, that they cannot (legally) commit not to use. As a result, individual rationality (IR) constraints must always be satisfied. If, following exogenous changes in the economic environment, a continuation of the 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 allocation is compatible with both IR constraints being satisfied, then separation results; otherwise, Pareto weights are modified in such a way that the IR constraint that was initially violated becomes exactly binding. The appealing property of LIC contract is that allocations are (ex ante) second best optimal; i.e., spouses implement an allocation that is ex ante efficient under the IR constraints, as established by an abundant literature.[4]

1.1 Empirical implementation

The classical analysis of dynamic labor supply models, based on Euler equations *at the household level*, is specific to unitary models and does not consider intrahousehold aspects; therefore it is not suitable for collective models. Few empirical tests have been proposed in the literature to evaluate intertemporal collective models; mostly, these contributions test the full commitment model against partial or no commitment. Mazzocco (2007) was the first to test the unitary intertemporal model against its collective competitor (using, in the latter case, Euler equations at the *individual* level). Results clearly rejected the unitary approach. He then tested the validity of the FIC against its no- or limited-commitment counterpart; using consumption data for the United States, he rejected the validity of the FIC. Lise and Yamada (2018), using a similar strategy, proposed a functional form of bargaining power, in terms of initial and contemporary characteristics. Using the Japanese Panel Survey of Consumers, they also found that bargaining power is not exclusively determined by the household's initial situation, thus rejecting the validity of the FIC. Other examples are Voena (2015) and Blau and Goodstein (2016).

In principle, testing for full commitment is straightforward: one only need to check whether actual behavior is compatible with constant (i.e., time- and state-invariant) Pareto weights - a task that is facilitated by the fact that, in general, Pareto weights can at each period be identified from labor supply or consumption behavior.[5] Testing for partial versus no commitment, on the other hand, is more difficult. In both cases, indeed, Pareto weights may vary in response to shocks; the difference between the two versions relates to the specific manner that variations may take place. A possible approach would exploit the

[4]See for instance Kocherlakota (1996) or Ligon et al. (2002).
[5]See Browning et al. (2014).

Markovian nature of changes in Pareto weights under the LIC assumptions, as in Lise and Yamada (2018); however, this requires an explicit, structural model of household behavior, implying that any test is a joint test of the particular specification used for that purpose.

The present paper reconsiders issues related to intrahousehold commitment in an intertemporal, collective model of labor supply, from a more 'reduced form' perspective. A semi-log parametrization of labor supply equations is adopted, which provides an empirical test for household intertemporal commitment. The approach adopted here relies on the following intuition.[6] Consider a couple hit, after marriage, by some random productivity shocks. Under FIC, these shocks, whether past or current, cannot possibly 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 must therefore remain unchanged. Under NC, the patterns are, paradoxically, similar. *Current* shocks systematically affect current behavior; *past* shocks, however, are bygones and should be forgotten in the current renegotiation, at least to the extend that they do not affect future wages.

LIC models, however, generate more complex dynamics. Productivity shocks typically affect an agent's outside options, and may thus make the IR constraint more difficult to satisfy. A large, unexpected shock (or, equivalently, an accumulation of smaller shocks operating in the same direction) may result in a violation of an IR constraint, therefore in a change in Pareto weights. These changes, however, are now semi-permanent: the new Pareto weights will remain untouched until some IR constraint is again violated. In other words, LIC mechanisms introduce a memory in the labor supply process, whereby past variations that did affect Pareto weights in any given period may impact future behavior. That is the property we investigate empirically.

We test this prediction using data from the PSID of the United States for years 2015 and earlier. Specifically, we investigate whether, once current and future (expected) wages are controlled for, *unexpected* past shocks have a long term impact on labor supply behavior, measured by yearly hours of work. The link between individual bargaining powers (as summarized by the Pareto weights) and labor supply has been repeatedly established in the literature.[7] In a LIC context, past shocks affecting wages should have a similar impact. That is, if

[6] The intuition is directly related to both Lise and Yamada (2018) and Dubois et al. (2008).

[7] For instance, Chiappori et al. (2002) showed that the state of the marriage market, as proxied by the sex ratio, and the laws governing divorce both influence individual labor supply, and that these effects satisfy the restrictions generated by the collective model. Similarly, Voena (2015) shows, using the panel dimension of the PSID, that the switch from mutual consent to unilateral divorce unambiguously affected the intra-household allocation of power by enhancing the bargaining position of the less wealthy spouse (usually the wife), resulting in significant changes in saving and labor supply. This effect, however, is present only in states where courts tend to equally divide assets between spouses.

one spouse experiences particularly large, positive wage shocks, we expected this spouse's future labor supply to decline. Indeed, the resulting shift in bargaining positions should result in that spouse attracting a larger fraction of household resources - which, by a standard income effect, should increase that spouse's demand for leisure. Interestingly, the same mechanism would also imply an *increase* in the *partner's* labor supply, even when the partner was not personally impacted by any wage/productivity shock. Obviously, a negative shock would have the opposite impact.

Several issues must be considered when performing such estimations. First of all, wage realization at any given period can affect Pareto weights only if they were not anticipated at the date of marriage; indeed, expected future wage increases would typically have been taken into account at the beginning of the relationship, and thus integrated into the initial Pareto weights. To address this issue, we first estimate a model of wage dynamics based on recent advances in the empirical literature.[8] We can then, at any period, distinguish between expected and unexpected wage variations, and we concentrate on the labor supply impact of the latter type. Second, selection effects should be considered, particularly since matching on the marriage market is typically assortative on wages and human capital. We therefore systematically control for *initial* wages (i.e., individual wages at the beginning of either the marital relationship or the PSID record). Alternatively, we use the panel structure of the PSID to introduce household fixed effects in our regression - although this probably leads to underestimating the effects at stake, since the lasting impacts of early shocks are typically hard to distinguish from a household fixed effect.

We then consider two types of robustness tests. First, changes in Pareto weights should in principle affect all aspects of household behavior and not only labor supply.[9] We therefore analyze the effects of past wage shocks on the household's demand for a public good - in the case of PSID, housing.[10] Unlike labor supply, the direction of the impact is not a priori clear, since it depends on the spouses' respective preferences for public consumption.[11] In particular, a shock improving the wife's (say) bargaining strength may either increase or decrease household demand for housing, depending on the preferences of each

[8]Our approach relies in particular on a recent contribution by Altonji et al. (2013).

[9]The impact of 'distribution factors' (i.e., variables that exclusively affect the spouses' respective bargaining positions) on household demand have been empirically considered in several contributions. Most of the time, the distribution factors under consideration are the spouses' non-labor incomes (e.g., Thomas, 1990; Lundberg et al., 1997; Mazzocco, 2007; Cherchye et al., 2012; Attanasio and Lechene, 2014). In our framework, though, past shocks play exaclty the role of distribution factors.

[10]The PSID also provides information on children expenditures. However, an exhaustive analysis of children as public goods would also involve an investigation into investments in parental time and an estimation of the production function of children human capital, which would be far exceed the scope of this paper. For a detailed discussion, see for instance Chiappori et al. (2019).

[11]Technically, increasing a spouse's bargaining position boost the household demand for a public good if and only if that spouse's marginal willingness to pay for the public good is more income-sensitive than that of the partner (see Blundell et al., 2005).

gender. Still, a significant impact of past wage shocks on current demand for public goods, *when wealth, total expenditures and current and future wages are controlled for*, would be hard to explain in either a unitary or a FIC or NC collective framework.

Second, the effects under consideration are specific to the bargaining mechanism implicit in a collective framework. As such, they should not be present in single-person households. Therefore, we estimate the same regressions on singles, in order to check that the results are indeed specific to couples.

Estimates clearly reject the full commitment and non-commitment models, and provide evidence in favor of the limited commitment model. Controlling for (current and future) wage effects, prior wage deviations, indicating whether spouses did better (or worse) than expected in the past, are significantly correlated with present labor supply. This effect is suggestive of a change in Pareto weights; indeed, *all* signs are consistent with the theoretical predictions of the limited intertemporal commitment model (although not all are significant). Lastly, we do observe a significant (and negative) impact of the wife's past wage deviations on the household's housing expenditures. All these findings strongly support the LIC version of the collective model.

The remainder of the paper is organized as follows. The theoretical model is developed in Section 2. Section 3 describes the data and empirical strategy, and Section 4 presents the estimation results. Finally, Section 5 sets out the main conclusions.

2 Data

We use data from the Panel Study of Income Dynamics (PSID). The PSID is 'the longest running longitudinal household survey in the world' (more information at https://psidonline.isr.umich.edu/). It is conducted every two years by the University of Michigan (since 1968) and contains data on a range of factors, including employment, income, wealth, and marriage, among others, and covers information at the family and individual level, for all individuals in each of the interviewed households.

We use data from the PSID interviews from year 2015, with interviews referring to the previous year. For households interviewed in 2015, we also use data from all the previous waves of the PSID in which they appear, back to 2001.[12] We restrict the sample to two-member households formed by a husband and a wife, or cohabiting unmarried partners, between 18 and 65 years old. We concentrate on households whose composition has remained stable over the analyzed period; we therefore eliminate those families in which there has

[12] Previous waves did not include the required information to define consistently non-labor income.

been a divorce, and/or a wife or husband has engaged in a new marriage or cohabitation. The study of the interaction between household formation and/or dissolution and collective labor supply is an intriguing topic beyond the scope of this paper. We also eliminate families with missing information in the variables used throughout the analysis. Finally, we retain households with information in uninterrupted periods only. These restrictions leave us with a sample of 2,106 households. Each household appears on average in 7.25 waves, with 70.3% of the sample (1,480 households) being followed back to 2001.

The PSID allows us to directly define the labor supply of wives and husbands as the total annual hours of market work on all jobs. For wages, the PSID provides information on the total annual labor income (in dollars) of individuals, on all jobs. We define wage rates of wives and husbands as the rate of total labor income over total hours of work. The PSID provides information for demographics at the individual level, including age (measured in years) and the number of completed years of education (measured in years). The PSID also provides information at the family level, i.e., information that refers to households as units. For instance, we have information about the total annual income (in dollars) of every interviewed family (including taxable income, transfer income, and Social Security income of the household). We define non-labor annual income, net of savings, as the household total expenses, minus the sum of labor income of family members. This definition excludes savings and avoids an important source of endogeneity and bias. The PSID also provides data on the region in which the household resides, and we define four dummies, classifying households in four regions: Northeast, North, West, and South. Furthermore, the PSID contains information on all the family members, and we consider the age of those members, and in particular the number of children in each household. Given that the age of the children may condition the behavior of mothers and fathers (Miller and Mulvey, 2000; Silvers, 2000; **?**), we define two variables at family level: the number of children aged 6 or younger in the household, and the number of children between ages 7 and 17 (inclusive). The PSID allows us to define the household's housing expenditure, in dollars per year.[13]

Table 1 shows summary statistics of our variables, differentiating between wives and husbands in the case of variables defined at the individual level. These descriptives are computed using the specific weights provided by the PSID: 69.8% of wives and 89.6% of husbands report being employed, with 1,305 households where both the wife and the husband work. The average hours of work per year is 1,714 for working wives, and 2,203 for working husbands. The average hourly wages are 23.8 and 30.3 per hour for wives and husbands. The average age of wives is 47.5 years, while that of husbands is 48.9 years. Women in the sample are slightly more educated than men, with 13.947 years of complete education on average, vs 13.678 of men. Finally, 77.4% (82.7) of wives (husbands) are white, and 4.7% (7.5) are black. The remainder of the sample

[13]The PSID only provides data on expenditures at the household level, which prevents us from a more detailed analysis of sharing rules and bargaining power using individual consumptions and/or exclusive goods (see Browning et al., 2014).

are non-whites and non-blacks, including Asians, Latin-Americans, and others. All these differences between women and men are statistically significant at standard levels. Regarding household attributes, the average non-labor income of households is \$2,029 per year, net of savings. The average number of children under 6 years (inclusive) is 0.244, while the average number of children between 7 and 17 years (inclusive) is 1.063. Finally, households with children spend, on average, \$803 per year in childcare, vs the \$24,606 per year that households spend, on average, on housing.[14]

We estimate wages using a model based on Altonji et al. (2013), who analyzed wages, earnings, employment and work hours, and study several aspects of these dynamics, including the effects of various shocks, such as human capital, job changes, and unemployment. As wages are modeled in terms of factors that can be observed by individuals, this represents an adequate model for expected wages. Since we are interested only in the predicted outcome of the wage model, i.e., in expected wages, we only need to estimate the main log-wage model. We regress log-wages over race (a dummy that takes value 1 if individuals are black, 0 otherwise), years of education, a polynomial on experience and employer tenure, a dummy measuring job changes (taking value 1 if the individual has changed job in the previous year, 0 otherwise), and two lags of log-wages.[15] We also include year and region fixed effects. In order to control for selection into employment, we estimate a Heckman (1979) model, in which the selection equation is identified from the exclusion in the main equation of the marital indicator and the presence of children. Estimates are shown in Table A2 in the Appendix.[16] The inverse Mills ratio is significant and negative for women, indicating the presence of sample selection bias. For men, the inverse Mills ratio is small and non-significant. The average predicted log wages are \$2.986 and \$3.212 log per hour for women and men, respectively, for the year 2015. These predicted log wages are slightly larger than reported wages of working wives and husbands, \$2.922 and \$3.081 log per hour, respectively.

Lastly, these estimates allow us to decompose, for any period t, the observed wage into the sum of an expected component and a 'deviation'; our main purpose is to study the impact of past deviations on current behavior, controlling for current and future expected wages. In particular, the prediction of future wages at the end of the observation period requires some assumptions, as we do

[14] Previous research (e.g., Chiappori et al., 2002; Rapoport et al., 2011; Campaña et al., 2018) has used the state-level sex ratio as a distribution factor. We do not follow this path here, mostly because data shows no significant changes in the sex ratio over the period under consideration (see Figure A1).

[15] See Figure A2 in the Appendix for the theoretical system of equations that determine log wages in Altonji et al. (2013). Variables are defined and computed from the PSID following Altonji et al. (2013). Table A1 in the Appendix shows summary statistics of variables used in the wage model.

[16] For the first two years of a household in the sample, we cannot include two lags of log wages. To reduce potential omitted variable bias, information of lagged wages for the years 2003 and 2001 is taken from the 1999 and 1997 waves of the PSID. 63.5% of the sample can be followed back to 1997. Results are available upon request.

not have information of individuals for subsequent years. The value of several variables, as experience, education or gender, can be univocally predicted; we moreover assume that individuals will not change their region of residence. We also assume that individuals base their wage expectation on their current job, that is to say, that these expectations do not involve a job change in the next period.[17]

3 Empirical results

3.1 Labor supply

We analyze the number of annual hours of (market) work (divided by 1,000) by estimating the following system of SUR equations:

$$\begin{aligned} h_{A,i} = \; & f_0 + f_1^0 \log w_{A0,i} + f_2^0 \log w_{B0,i} + f_3^0 y_{0,i} + f_4^0 \log w_{A0,i} \log w_{B0,i} \\ & + f_1 \log w_{A,i}^{E,t} + f_2 \log w_{B,i}^{E,t} + f_3 y^t + f_4 \log w_{A,i}^{E,t} \log w_{B,i}^{E,t} \\ & + f_5 \log w_{A,i}^{E,t+1} + f_6 \log w_{B,i}^{E,t+1} + \\ & f_7 d_{A,i}^t + f_8 d_{A,i}^{0,\ldots,t-1} + f_9 d_{B,i}^t + f_{10} d_{B,i}^{0,\ldots,t-1} + \\ & f_{11} z_{A,i} + \varepsilon_{A,i} \end{aligned}$$

and

$$\begin{aligned} h_{B,i} = \; & m_0 + m_1^0 \log w_{A0,i} + m_2^0 \log w_{B0,i} + m_3^0 y_{0,i} + m_4^0 \log w_{A0,i} \log w_{B0,i} \\ & + m_1 \log w_{A,i}^{E,t} + m_2 \log w_{B,i}^{E,t} + m_3 y^t + m_4 \log w_{A,i}^{E,t} \log w_{B,i}^{E,t} \\ & + m_5 \log w_{A,i}^{E,t+1} + m_6 \log w_{B,i}^{E,t+1} + \\ & m_7 d_{A,i}^t + m_8 d_{A,i}^{0,\ldots,t-1} + m_9 d_{B,i}^t + m_{10} d_{B,i}^{0,\ldots,t-1} + \\ & m_{11} z_{B,i} + \varepsilon_{B,i} \end{aligned}$$

where $h_{A,i}$ and $h_{B,i}$ are wives and husbands' annual number of working hours in household i at the current date t. Here, $w_{A,i}^{E,s}$ and $w_{B,i}^{E,s}$ represent the expected wage at date s; $d_{A,i}^t$ and $d_{B,i}^t$ represent the current 'wage deviation', defined as the unexpected component of current wages, while $d_{A,i}^{0,\ldots,t-1}$ and $d_{B,i}^{0,\ldots,t-1}$ represent prior cumulative deviations; z_A and z_B are socio-demographics, and $\varepsilon_{A,i}$ and $\varepsilon_{B,i}$ the error terms. Estimates include region fixed effects, and specific sample weights provided by the PSID. It must be noted that the inclusion of future wages is required for the model not to be misspecified. If future expected wages were not included, estimates would potentially suffer from omitted variable bias, and results could not be consistent. We precisely want to test whether, controlling for future (expected) wages, previous wage deviations still have an effect on spouses' labor supply.

Estimates are shown in Columns (1) and (2) of Table 2, restricted to households where spouses report positive hours of work. The initial wages of both

[17] A different assumption regarding job changes would require additional predictions of future job changes. This is left for future research.

husband and wife significantly affect husband's labor supply, reflecting unobserved heterogeneity and assortative matching in the marriage; however, wife's labor supply is not significantly impacted by initial wages. The expected wage of each spouse is found to increase that spouse's labor supply and decrease the partner's, as expected from a standard income effect; the impact is however smaller for the husband (in particular, his labor supply appears inelastic to both the expected and unexpected component of his wage). The same pattern is observed for the non expected component of current wages, with essentially the same magnitudes. Lastly, his future (expected) wage decreases her labor supply, again by a standard income effect; all other effects of future wages are not significant.

The main conclusion of this Table is the impact of past, unexpected wage variations. The signs are exactly as predicted by the theoretical arguments sketched above: when a spouse did better than expected in terms of past wage realizations, that spouse works less and their partner works more. The estimated effects are actually quite large (with the exception of the impact of his past wage deviations on her labor supply, which is quantitatively small and not significant). Interestingly, the wife's past wage deviations appear to have a quantitatively much larger (own- and cross-) impact that the husband's, suggesting that respective bargaining positions are more sensitive to her past wages than to his.

Regarding the rest of the explanatory variables, we find that age is negatively correlated with the hours of work of wives and husbands. Race is not significant, and education is only significant, and negative, for wives. The number of children is negatively correlated with the hours of work of wives, but positively correlated with hours of work of husbands, especially for children under 6 years old. These results are in line with other theories, such as the household responsibilities hypothesis (Giménez-Nadal and Molina, 2016), or Becker (1991)'s model of division of labor in households.

Table 3 presents the same regressions, with the difference that the panel structure of the PSID is used to introduce household fixed effects in the regression. Concentrating on the impact of past variations, we find that the signs remain unchanged, but the coefficients of the wife's previous shocks are no longer significant; on the other hand, the husband's past shocks are found to significantly increase her labor supply, again comforting the LIC version of the collective model. In Table 4, the baseline regression is enriched by independently considering positive and negative wage shocks. A clear conclusion is that the impact of *positive* shocks is both more significant and quantitatively larger than that of negative shocks; i.e., it appears that individuals are somewhat protected against downside risks while benefiting from favorable shocks.[18]

Finally, Table 5 provides a robustness check by presenting the same regres-

[18]A possible explanation is the role of *insurance* mechanisms within the household (in the spirit of Harris and Holmstrom 1982). Clearly, this interpretation would require further investigations.

sions on a sample of singles. The observed patterns are quite interesting. While past wage deviations are still significant in the baseline formulation, their impact is quantitatively much smaller than for couples (by a factor of 2.5 for men and 10 for men). More importantly, the impact is now *positive.* This clearly shows that, at least regarding this aspect, the dynamics of labor supply are quite different for couples than for singles, and that the specific patterns observed in the previous regressions are specific to household decision processes. In fact, while the impact of past shocks on current labor supply may, at least in a small part, result from an imperfect estimation of the wage dynamics, the estimates on singles indicate that this bias would if anything go *against* us, suggesting an even stronger impact of past shocks on current bargaining positions. Lastly, these effects totally disappear in the fixed effect version of the singles regression.

3.2 Public expenditure of the household

In order to provide a complementary analysis of collective behavior, we estimate the impact of wage deviations on housing expenditures. We thus estimate the following equationl:

$$\begin{aligned} C_i = \quad & c_0 + c_1 \log w_{A,i}^{E,t} + c_2 \log w_{B,i}^{E,t} + c_3 X_i^t + c_4 \log w_{A,i}^{E,t} \log w_{B,i}^{E,t} \\ & + c_5 \log w_{A,i}^{E,t+1} + c_6 \log w_{B,i}^{E,t+1} + c_7 y_i^t \\ & + c_8 d_{A,i} + c_9 d_{A,i}^{0,\ldots,t-1} + c_{10} d_{B,i} + c_{11} d_{B,i}^{0,\ldots,t-1} \\ & + c_{12} z_i + \varepsilon_{C,i}, \end{aligned} \tag{1}$$

where (omitting the household index i) C represents household i's expenditures on housing (including mortgages and loans, rent, property tax, insurance, utilities, TV, telephone, internet, repairs, and furnishings); z represents the union of z_A and z_B; and we condition on both total expenditures X^t and non labor income y^t (the latter term being aimed at capturing wealth effects). The rest of the explanatory variables are analogous to equation (1).

Table 6 shows estimates of equation (2) in the fixed effect model. The main conclusion is that the wife's past wage deviations have a significant, negative effect on housing expenditures. When she did better than expected in the past, in terms of wage realizations, this tends to decrease the amount spent on housing. Note that this pattern is unlikely to reflect any omitted wealth effect, since it is hard to see how better than expected past wage realizations (for the wife) could possibly reduce either current or future (expected) wealth. Again, the LIC framework provides a natural explanation: the shocks resulted in changes in Pareto weights, and wives show a smaller preference for public consumption in terms of housing expenditure.

4 Conclusions

This paper explores intertemporal aspects of household labor supply and intrahousehold commitment, from the perspective of collective models. To that end, a collective model of labor supply is proposed, with a focus on the ability of spouses to commit in the mid- and long-term. Based on this model, a test for household commitment is proposed that allows us to distinguish between non-commitment, limited commitment, and full commitment.

A few conclusions emerge from this analysis:

- Even controlling for present and future wages as well as for selection, it appears that unexpected shocks on wages and productivity have a lasting effect on labor supply. Moreover, the resulting patterns exactly fit the predictions of the LIC version of the collective model. When a spouse did better than expected, (s)he works less, suggesting that (s)he attracts a larger fraction of household resources.
- The impact of past shocks is not limited to labor supply; it also affects household demand, in a manner that can again be explained by a shift in the spouses' respective bargaining positions.
- The magnitudes of the observed effects indicate, furthermore, that the intrahousehold allocation of power is more sensitive to shocks affecting female wages than to those impacting men. This suggests that a more structural approach, aimed at directly estimating the dynamics of Pareto weights, might lead to interesting insights. This is left for future research.
- Finally, our regressions hint at an asymmetric effect of wage shocks: positive shocks seem to matter more than negative ones. This may reflect the existence of risk-sharing mechanisms within the household; again, this should be the topic of future research.

On the basis of this model, we can thus at least tentatively conclude that the empirical study of the intertemporal aspects of household labor supply and consumption, using the PSID data, provides evidence in favor of the collective model, and particularly of its limited commitment formulation, against both the unitary framework and the non-commitment and full commitment versions of the collective model. The dynamics of labor supply, and more generally of decision processes, are quite different for couples than for singles. In particular, evolving bargaining positions seem to play an important role in couples' dynamics, in a way that is much more complex than either full- or no-commitment models would suggest.

Understanding intrahousehold allocations is crucial to understanding the effects of public policies, which often have intertemporal or dynamic aspects. Also, intrahousehold processes, such as household formation, divorce, income, and wealth transfers are important for policy issues, and have a dynamic dimension. But most collective models that were taken to data were based on a static framework, which prevents a full understanding of intrahousehold processes, and the effects of household policies may then be inaccurately predicted. Within this context, the development of a dynamic framework for collective models is needed, to improve our knowledge of the dynamics of intrahousehold bargaining, household formation and dissolution, wealth transfers, and policy interventions. This paper strongly suggests that LIC models constitute an excellent candidate for the development of dynamic models of household behavior.

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Table 1: Summary statistics

Individual variables	Wives		husbands		Diff.
	Mean	S.D.	Mean	S.D.	p-value
Labor participation	0.698	0.459	0.896	0.305	(<0.001)
Hours of work	1.714	0.692	2.203	0.671	(<0.001)
Wage	23.838	16.495	30.300	24.299	(<0.001)
Log-wage	2.922	0.843	3.081	1.071	(<0.001)
Predicted log-wage	2.986	0.461	3.212	0.563	(<0.001)
Age	47.463	10.593	48.945	10.677	(<0.001)
Years of education	13.947	2.765	13.678	2.822	(<0.001)
White	0.774	0.419	0.827	0.378	(<0.001)
Black	0.047	0.212	0.075	0.263	(<0.001)

Family variables	Mean	S.D.
Non-labor income	2.029	6.242
Expenditure in housing	24.606	15.634
N. children $\leq$ 6 years	0.244	0.614
N. children 7-17 years	1.063	1.142
N. Families	2,106	

Note: Summary statistics are computed using specific weights provided by the PSID. T-type test p-values for the differences between husbands and wives in parentheses. The sample (PSID 2015) is restricted to stable households. Labor force participation takes value 1 if individuals report positive hours of work, zero otherwise. Hours of work is measured in hours worked per year, divided by 1,000 (only for working individuals). Wages are measured in dollars per hour of work (only for working individuals). Log-wages are defined as the logarithm of 1 plus wages (only for working individuals). Non-labor income, and household expenditures are measured in dollars per year, divided by 1,000. Expenditure in childcare is restricted to households with children.

Table 2: Labor supply estimates

VARIABLES	(1) Wives	(2) Husbands
Wife log-wage (t = 0)	0.036	-0.194***
	(0.045)	(0.045)
Husband log-wage (t = 0)	0.008	-0.169***
	(0.041)	(0.040)
Non-labor income (t = 0)	0.001	-0.018***
	(0.007)	(0.007)
Cross log-wage (t = 0)	-0.009	0.062***
	(0.015)	(0.015)
Wife log-wage (pred.)	0.363***	-0.113*
	(0.065)	(0.063)
Husband log-wage (pred.)	-0.144***	0.038
	(0.049)	(0.050)
Non-labor income	-0.013**	-0.001
	(0.006)	(0.006)
Cross log-wage	0.046***	0.009
	(0.014)	(0.014)
Wife wage deviation	0.363***	-0.142**
	(0.064)	(0.063)
Wife wage prior deviations	-0.584***	0.123*
	(0.076)	(0.074)
Husband wage deviation	-0.120**	0.041
	(0.048)	(0.049)
Husband wage prior deviations	0.014	-0.135*
	(0.071)	(0.073)
Wife future log-wage	0.141	-0.088
	(0.099)	(0.092)
Husband future log-wage	-0.343***	0.023
	(0.088)	(0.093)
Constant	1.872***	2.813***
	(0.249)	(0.253)
Socio-demographics	Yes	Yes
Region F.E.	Yes	Yes
Observations	1,305	1,305

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. The dependent variable is the annual hours of work of wives and husbands, divided by 1,000. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 3: Labor supply fixed effects estimates

	Complete sample		Working spouses	
	(1)	(2)	(3)	(4)
VARIABLES	Wives	Husbands	Wives	Husbands
Wife log-wage (pred.)	0.367***	0.010	0.336***	0.008
	(0.009)	(0.010)	(0.013)	(0.013)
Husband log-wage (pred.)	-0.008	0.397***	-0.029**	0.307***
	(0.008)	(0.009)	(0.014)	(0.015)
Non-labor income	-0.012***	-0.023***	-0.016***	-0.022***
	(0.001)	(0.001)	(0.002)	(0.002)
Cross log-wage	0.008***	0.028***	0.018***	0.037***
	(0.003)	(0.003)	(0.004)	(0.005)
Wife wage deviation	-0.256***	0.007	-0.255***	-0.040**
	(0.015)	(0.017)	(0.019)	(0.020)
Wife wage prior deviations	-0.004	0.001	-0.005	0.000
	(0.005)	(0.005)	(0.006)	(0.007)
Husband wage deviation	-0.033**	-0.334***	-0.027	-0.338***
	(0.014)	(0.016)	(0.019)	(0.020)
Husband wage prior deviations	0.013***	-0.004	0.022***	-0.010
	(0.004)	(0.005)	(0.006)	(0.006)
Wife future log-wage	0.157***	-0.241***	0.073**	-0.268***
	(0.025)	(0.027)	(0.035)	(0.036)
Husband future log-wage	-0.108***	0.037*	-0.187***	-0.055*
	(0.019)	(0.022)	(0.030)	(0.032)
Constant	1.177***	2.587***	1.339***	2.570***
	(0.120)	(0.136)	(0.166)	(0.174)
Socio-demographics	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes
Observations	11,969	11,969	7,455	7,455
N. Households	2,106	2,106	1,305	1,305

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. The dependent variable is the annual hours of work of wives and husbands, divided by 1,000. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 4: Labor supply estimates - Positive and negative deviations

VARIABLES	(1) Wives	(2) Husbands
Wife log-wage (t = 0)	0.010	-0.183***
	(0.045)	(0.045)
Husband log-wage (t = 0)	-0.018	-0.158***
	(0.040)	(0.040)
Non-labor income (t = 0)	-0.000	-0.017**
	(0.007)	(0.007)
Cross log-wage (t = 0)	0.002	0.057***
	(0.015)	(0.015)
Wife log-wage (pred.)	0.300***	-0.090
	(0.066)	(0.065)
Husband log-wage (pred.)	-0.132***	0.009
	(0.050)	(0.051)
Non-labor income	-0.015**	-0.000
	(0.007)	(0.007)
Cross log-wage	0.061***	0.010
	(0.014)	(0.014)
Wife wage deviation (>0)	0.270***	-0.096
	(0.067)	(0.066)
Wife wage deviation (<0)	0.322***	-0.130**
	(0.066)	(0.065)
Wife wage prior deviations (>0)	-0.807***	0.219**
	(0.090)	(0.091)
Wife wage prior deviations (<0)	-0.303***	-0.027
	(0.103)	(0.101)
Husband wage deviation (>0)	-0.132**	0.016
	(0.052)	(0.053)
Husband prior deviations (<0)	-0.102**	0.015
	(0.051)	(0.052)
Husband wage prior deviations (>0)	-0.116	-0.239**
	(0.095)	(0.094)
Husband wage prior deviations (<0)	0.074	0.016
	(0.098)	(0.101)
Wife future log-wage	0.085	-0.105
	(0.100)	(0.093)
Husband future log-wage	-0.418***	0.036
	(0.090)	(0.095)
Constant	2.181***	2.799***
	(0.254)	(0.260)
Socio-demographics	Yes	Yes
Region F.E.	Yes	Yes
Observations	1,305	1,305

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. The dependent variable is the annual hours of work of wives and husbands, divided by 1,000. Positive and negative past wage deviations defined as the sum of only positive or negative deviations, respectively. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 5: Labor supply estimates for singles

	Baseline estimates		Fixed effects estimates			
			Complete sample		Working spouses	
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Women	Men	Women	Men	Women	Men
Log-wage (t = 0)	-0.022	-0.046	-	-	-	-
	(0.030)	(0.033)				
Non-labor income (t = 0)	-0.005	-0.012***	-	-	-	-
	(0.003)	(0.004)				
Log-wage (pred.)	0.442***	0.476***	0.434***	0.417***	0.107**	-0.062
	(0.069)	(0.088)	(0.015)	(0.019)	(0.046)	(0.049)
Non-labor income	-0.034***	-0.037***	-0.022***	-0.027***	-0.032***	-0.031***
	(0.004)	(0.005)	(0.001)	(0.002)	(0.002)	(0.003)
Wage deviation	-0.230***	-0.029	-0.350***	-0.277***	-0.360***	-0.327***
	(0.053)	(0.056)	(0.025)	(0.029)	(0.031)	(0.033)
Wage prior deviations	0.044***	0.057***	-0.012	0.003	-0.014	0.005
	(0.015)	(0.016)	(0.008)	(0.010)	(0.013)	(0.015)
Future log-wage	-0.152**	-0.374***	-0.011	0.016	-0.198***	-0.236***
	(0.075)	(0.089)	(0.034)	(0.040)	(0.047)	(0.054)
Constant	1.539***	1.581***	1.615***	0.804***	1.953***	1.354***
	(0.199)	(0.248)	(0.170)	(0.292)	(0.216)	(0.343)
Socio-demographics	Yes	Yes	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	-	-	6,221	3,881	3,978	2,673
N. Individuals	1,212	952	1,398	1,022	969	772

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to single workers. The dependent variable is the annual hours of work of women and men, divided by 1,000. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

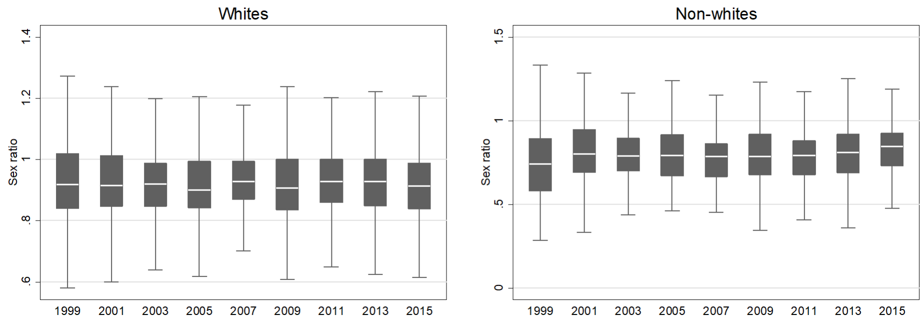
Table 6: Public expenditure on housing

VARIABLES	Fixed effects estimates	
	(1)	(2)
	F.E.	IV F.E.
Wife log-wage (pred.)	-0.141	-0.205
	(0.235)	(0.240)
Husband log-wage (pred.)	0.300	0.256
	(0.204)	(0.207)
Non-labor income	0.136***	0.126***
	(0.033)	(0.034)
Cross log-wage	-0.130*	-0.131*
	(0.076)	(0.076)
Wife wage deviation	0.435	0.398
	(0.390)	(0.393)
Wife wage prior deviations	-0.244**	-0.241**
	(0.115)	(0.116)
Husband wage deviation	0.274	0.150
	(0.363)	(0.374)
Husband wage prior deviations	-0.010	-0.001
	(0.106)	(0.106)
Wife future log-wage	0.866	0.733
	(0.635)	(0.644)
Husband future log-wage	1.394***	1.160**
	(0.498)	(0.525)
Total expenditure	-0.062***	0.001
	(0.006)	(0.043)
Constant	33.275***	34.828***
	(3.555)	(3.726)
Socio-demographics	Yes	Yes
Region F.E.	Yes	Yes
Observations	11,969	11,969
N. Individuals	2,106	2,106

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. The dependent variable is the shares of annual expenditure of the household in housing, in percentage. Total expenditure is instrumented by total household income in Column (2). *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

A Additional results

Figure A.1: Evolution of sex ratios



Source: United States Current Population Survey. Sex ratios computed as the number of males per each female, by age groups and state of residence.

Figure A.2: Altonji et al. (2013)'s wage model

$$wage_{it} = E_{it} wage_{it}^{lat}, \tag{1}$$

$$wage_{it}^{lat} = \left[X_{it}\gamma_X^w + \gamma_{t^3}^w t^3\right] + P(TEN_{it})\gamma_{TEN}^w + \delta_\mu^w \mu_i + \omega_{it} + \nu_{ij(t)}, \tag{2}$$

$$\omega_{it} = \rho_w \omega_{i,t-1} + \gamma_{1-E_t}^\omega (1 - E_{it}) + \gamma_{1-E_{t-1}}^\omega (1 - E_{t-1}) + \varepsilon_{it}^\omega, \tag{3}$$

$$\nu_{ij(t)} = (1 - S_{it})\nu_{ij(t-1)} + S_{it}\nu'_{ij'(t)}, \tag{4}$$

$$\nu'_{ij'(t)} = \rho_\nu \nu_{ij(t-1)} + \varepsilon_{ij(t)}^\nu. \tag{5}$$

Source: Altonji et al. (2013) pp. 1401. $Wage_{it}$ represents log-wage rates. E_{it} represents employment ($E_{it} = 1$ for employed individuals, 0 otherwise). $Wage^{lat}$ represents latent wages. X_{it} represents race, years of education, experience, and experience squared. t^3 represents the cube of experience. $P(TEN_{it})$ represents a polynomial on employer tenure. μ_i represents unobserved ability. ω_{it} represents a stochastic component that reflects persistence of skills and past wages. $\nu_{ij(t)}$ is the job-match-specific term, where $j(t)$ represents job offers at t.

Table A.1: Summary statistics - Wage model

Individual variables	Wives		Husbands		Diff.
	Mean	S.D.	Mean	S.D.	p-value
Log-wage	2.875	0.660	3.170	0.714	(<0.001)
Black	0.046	0.210	0.076	0.265	(<0.001)
Years of education	13.679	2.547	13.569	2.703	(<0.001)
Experience	2.595	1.063	2.718	1.069	(<0.001)
Tenure	0.728	0.827	0.851	0.957	(<0.001)
Job change	0.478	0.499	0.660	0.474	(<0.001)
Married	0.866	0.341	0.866	0.341	-
N. children ≤ 6	0.271	0.627	0.271	0.627	-
N. children 6-17	0.894	1.085	0.894	1.085	-
N. Observations	24,888		24,888		

Note: Summary statistics are computed using specific weights provided by the PSID. T-type test p-values for the differences between husbands and wives in parentheses. The sample (PSID 2015) is restricted to stable households. Children of interviewed households are not included in the sample. Log wages are defined as log of dollars per hour (only for working individuals). Experience and tenure are measured in years.

Table A.2: Heckman wage model

	Main equation		Selection equation	
	(1)	(2)	(3)	(4)
VARIABLES	Women	Men	Women	Men
Black	-0.036***	-0.120***	-0.091*	-0.231***
	(0.011)	(0.009)	(0.049)	(0.048)
Years of education	0.056***	0.058***	-0.003	0.004
	(0.002)	(0.002)	(0.007)	(0.008)
Experience	0.286***	0.416***	-0.765***	0.119
	(0.041)	(0.041)	(0.179)	(0.239)
Experience sq.	-0.113***	-0.134***	0.207***	-0.060
	(0.019)	(0.017)	(0.078)	(0.096)
Experience cub.	0.013***	0.014***	-0.024**	-0.000
	(0.003)	(0.002)	(0.010)	(0.012)
Tenure	0.136***	0.115***	159.66	526.70
	(0.027)	(0.022)	(0.000)	(0.000)
Tenure sq.	-0.025	-0.029*	-64.386	-36.816
	(0.022)	(0.017)	(0.000)	(0.000)
Tenure cub.	0.001	0.004	17.689	17.604
	(0.005)	(0.003)	(0.000)	(0.000)
Log wage ($t-1$)	0.411***	0.438***	-0.233***	-0.306***
	(0.007)	(0.006)	(0.018)	(0.017)
Log wage ($t-2$)	0.078***	0.081***	0.171***	0.181***
	(0.004)	(0.004)	(0.014)	(0.014)
Job change	-1.045***	-1.206***	141.27	751.53
	(0.022)	(0.023)	(0.000)	(0.000)
Married	-	-	1.604***	-0.124**
			(0.073)	(0.052)
N. children ≤ 6	-	-	-0.140***	0.071**
			(0.027)	(0.034)
N. children 7-17	-	-	0.020	-0.027
			(0.017)	(0.019)
Inverse Mill's ratio	-0.068***	0.001	-	-
	(0.013)	(0.016)		
Constant	1.561***	1.581***	-1.674***	-0.626***
	(0.044)	(0.044)	(0.183)	(0.233)
Year F.E.	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes
Observations	24,888	24,888	24,888	24,888

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. The dependent variable is the log hourly wage. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table A.3: Labor supply estimates - Robustness checks

	Economic crisis		First marriages and immigrants		Only non-immigrants		Only first marriages	
VARIABLES	(1) Wives	(2) Husbands	(3) Wives	(4) Husbands	(5) Wives	(6) Husbands	(7) Wives	(8) Husbands
Wife log-wage (t = 0)	0.036	-0.191***	0.036	-0.191***	0.040	-0.165***	0.126**	-0.176***
	(0.045)	(0.045)	(0.045)	(0.045)	(0.048)	(0.048)	(0.052)	(0.052)
Husband log-wage (t = 0)	0.010	-0.170***	0.010	-0.170***	0.025	-0.143***	0.076	-0.158***
	(0.041)	(0.040)	(0.041)	(0.040)	(0.043)	(0.042)	(0.047)	(0.046)
Non-labor income (t = 0)	0.002	-0.018***	0.002	-0.018***	0.004	-0.016**	0.007	-0.020***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Cross log-wage (t = 0)	-0.009	0.062***	-0.009	0.062***	-0.014	0.055***	-0.037**	0.057***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.017)	(0.017)
Wife log-wage (pred.)	0.359***	-0.115*	0.362***	-0.115*	0.352***	-0.141**	0.393***	-0.094
	(0.064)	(0.063)	(0.065)	(0.063)	(0.067)	(0.066)	(0.074)	(0.072)
Husband log-wage (pred.)	-0.147***	0.032	-0.147***	0.032	-0.173***	0.035	-0.115**	0.012
	(0.049)	(0.050)	(0.049)	(0.050)	(0.052)	(0.053)	(0.058)	(0.059)
Non-labor income	-0.013**	-0.001	-0.013**	-0.001	-0.012*	0.002	-0.009	-0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Cross log-wage	0.047***	0.008	0.047***	0.008	0.047***	0.009	0.054***	0.024
	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.016)	(0.016)
Wife wage deviation	0.359***	-0.142**	0.362***	-0.143**	0.355***	-0.174***	0.387***	-0.135*
	(0.064)	(0.063)	(0.064)	(0.063)	(0.067)	(0.066)	(0.074)	(0.072)
Wife wage prior deviations	-0.585***	0.130*	-0.588***	0.130*	-0.626***	0.169**	-0.657***	0.127
	(0.075)	(0.074)	(0.075)	(0.074)	(0.081)	(0.080)	(0.084)	(0.082)
Husband wage deviation	-0.123**	0.036	-0.122**	0.036	-0.141***	0.043	-0.085	0.023
	(0.048)	(0.049)	(0.048)	(0.049)	(0.051)	(0.052)	(0.057)	(0.058)
Husband wage prior deviations	0.016	-0.136*	0.016	-0.136*	0.031	-0.100	-0.077	-0.141*
	(0.071)	(0.073)	(0.071)	(0.072)	(0.077)	(0.078)	(0.083)	(0.084)
Wife future log-wage	0.144	-0.091	-0.351***	0.032	-0.328***	0.013	-0.417***	-0.105
	(0.098)	(0.092)	(0.088)	(0.093)	(0.095)	(0.100)	(0.103)	(0.110)
Husband future log-wage	-0.351***	0.033	0.145	-0.092	0.172	-0.087	0.139	-0.239**
	(0.088)	(0.093)	(0.099)	(0.092)	(0.105)	(0.100)	(0.109)	(0.102)
Immigrant household	-0.113*	0.010	-0.112*	0.010	-	-	-0.117*	-0.037
	(0.062)	(0.061)	(0.062)	(0.061)			(0.070)	(0.069)
First marriage	0.011	0.111**	0.011	0.111**	0.014	0.150***	-	-
	(0.045)	(0.045)	(0.045)	(0.045)	(0.048)	(0.048)		
Constant	1.961***	2.731***	1.956***	2.732***	1.920***	2.801***	1.807***	3.195***
	(0.255)	(0.258)	(0.255)	(0.258)	(0.281)	(0.281)	(0.286)	(0.290)
Socio-demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,305	1,305	1,305	1,305	1,184	1,184	1,025	1,025

Note: Standard errors in parentheses. The sample (PSID 2015) is restricted to stable households. Wage deviations for Columns (1) and (2) are based on predictions from a model analogous to the one shown in Table A2, but controlling for the per capita GDP growth, by year and State. Results are available upon request. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.