



# Do Significant Labor Market Events Change Who Does the Chores? Paid Work, Housework, and Power in Mixed-Gender Australian Households

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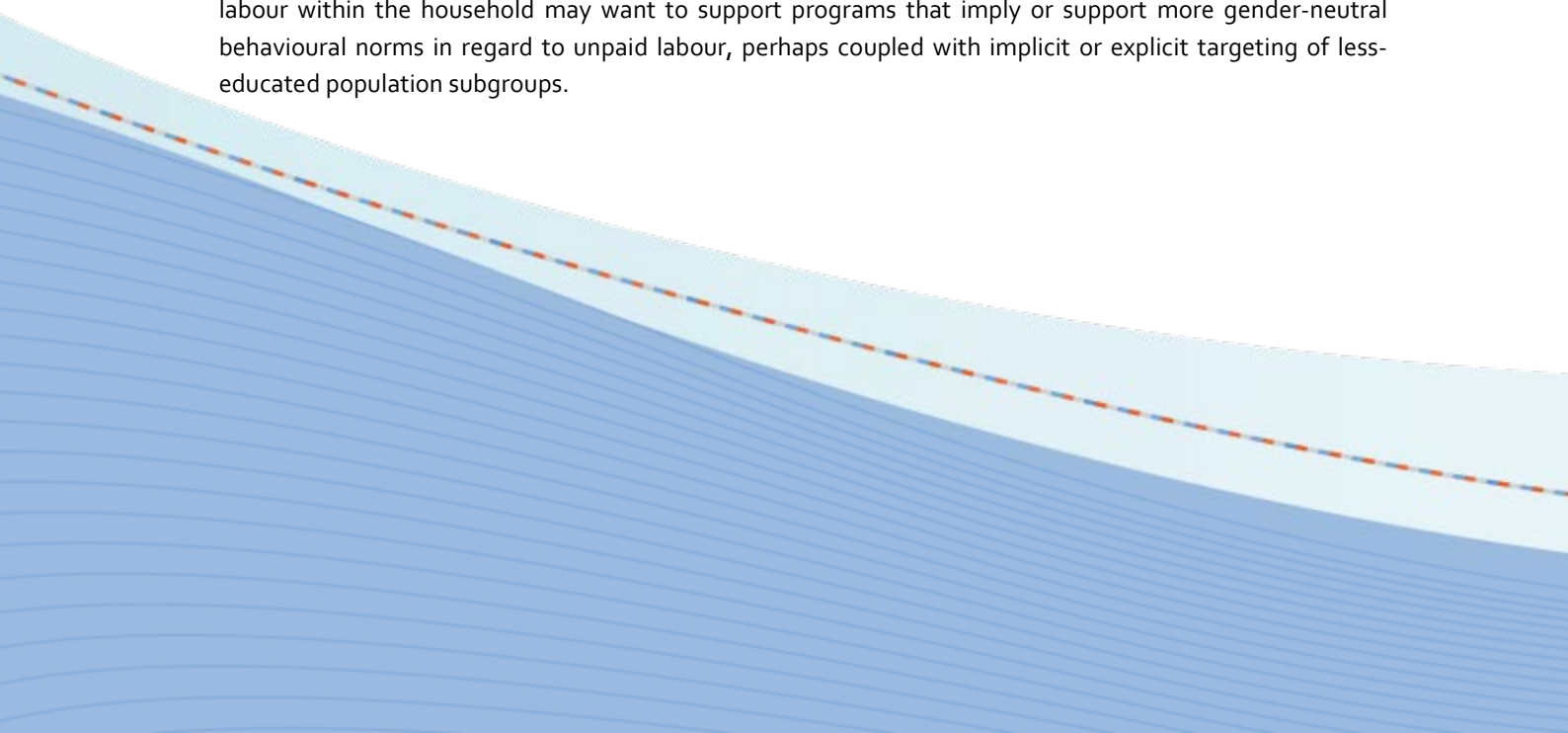
## NON-TECHNICAL SUMMARY

Couples around the world spend a substantial amount of time on routine household chores that result in such important products as family meals, clean clothes, and comfortable living spaces. The burden of producing these goods around the world, and in Australia, has fallen disproportionately on women. However, most of the material objectives of housework can in principle be produced by anyone, regardless of gender; skill requirements are limited. Assuming that no one enjoys doing housework, the observed division of household labour is often portrayed by social scientists either as the result of a negotiation between the partners such that the more powerful partner is allocated less housework or as a function of gender role attitudes. Prior work using proxies for power and attitudes suggests that both of these explanations play a role.

Our contribution in this paper exploits rich longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey that allow us to examine not how the time allocated to routine housework differs across couples, but how couples change their time allocation from year to year. We model these within-couple differences as a function of differences over time in household characteristics (including the number and ages of children; marital status; and the age, education, and disability status of each partner), residential characteristics, and survey year. Controlling for these factors, we focus on how couples' housework time allocations respond to major labor market events – in particular job promotions and terminations – which potentially alter the relative balance of economic power within the household, while also influencing household heads' time availability. The more (less) time an individual (partner) spends in paid employment, the less time he/she spends on housework, but there is also evidence that following a promotion, women report less time on housework and their partner reports more, indicating that gender power relations also play a role. The effect of promotions may actually be understated as we also find evidence that dual earner households are more likely to outsource household production to the market – by hiring maids and purchasing meals.

Power dynamics cannot, however, explain all the results. Further results indicate that households holding more liberal gender role attitudes are more likely to adjust their housework time allocations after female promotion events. Supporting the sociological theory that partners may 'do gender', we also find that in households with more traditional gender role attitudes, his housework time falls while hers rises when he is terminated.

These results suggest that female advancement in the formal labour market can go partway towards creating a more equal division of labour in the home, although the impact is modest and concentrated in more highly-educated households. Policy makers interested in promoting a more equal distribution of labour within the household may want to support programs that imply or support more gender-neutral behavioural norms in regard to unpaid labour, perhaps coupled with implicit or explicit targeting of less-educated population subgroups.



## ABOUT THE AUTHORS

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**DISCLAIMER:** The content of this Working Paper does not necessarily reflect the views and opinions of the Life Course Centre. Responsibility for any information and views expressed in this Working Paper lies entirely with the author(s).



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## **Abstract**

We examine how men and women in mixed-gender unions change the time they allocate to housework in response to labor market promotions and terminations. Operating much like raises, such events have the potential to alter intra-household power dynamics. Using Australian panel data, we estimate couple-specific fixed effects models and find that female promotion has the strongest association with housework time allocation adjustments. These adjustments are in part attributable to concurrent changes in paid work time, but gender power relations also appear to play a role. Further results indicate that households holding more liberal gender role attitudes are more likely to adjust their housework time allocations after female promotion events. Power dynamics cannot, however, explain all the results. Supporting the sociological theory that partners may ‘do gender’, we find that in households with more traditional gender role attitudes, his housework time falls while hers rises when he is terminated.

**Keywords:** Intra-household allocation; time use; gender; housework; Australia

## 1. Introduction

Meals, clean clothes, and comfortable living spaces are important ‘goods’ households produce. The burden of producing these goods around the world, and in Australia, falls disproportionately on women and has for some time (OECD 2011). However, most of the material objectives of housework – such as well-fed family members, clean clothes, and comfortable living spaces – can in principle be achieved by anyone, regardless of gender. Assuming that no one enjoys doing housework,<sup>1</sup> the observed division of household labor is often portrayed by social scientists either as the natural outgrowth of intra-household bargaining power or as a function of distinct gender role attitudes. Prior work using proxies for power and attitudes suggests that both of these explanations play a role. Our contribution in this paper exploits rich longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey that allows us to control for gender/couple-specific, observed and unobserved, time-invariant factors that are associated with both power and gender role attitudes. Controlling for these factors, we focus on how couples’ housework time allocations respond to major labor market events – in particular job promotions and terminations – which potentially alter the relative balance of economic power within the household, while also influencing household heads’ time availability.

Theoretical arguments in both economics and sociology imply a negative association between economic power and the time spent on housework. Empiricists typically rely on earnings or relative earnings as a proxy for power. This is the case for studies motivated by both the intra-household bargaining model (Becker 1991; Hersch and Stratton 1994; Stancaelli and Stratton 2014) and the collective model (Browning and Chiappori 1998) in economics<sup>2</sup>, and for studies motivated by sociologists’ relative resource theory (Blood and Wolfe 1960; Shelton and John 1993; Brines 1994; Greenstein 2000; Bittman et al. 2003; Gupta and Ash 2008; Baxter and Hewitt 2013). Yet earnings today are a function of past investments, and those investments themselves are related to the division of household time because time is a scarce resource. In addition, using earnings as a measure of power typically requires limiting the scope of analysis to couples in which both partners report an earnings measure, opening the door to sample selection bias. A second complication is the mechanical relation between earnings and paid work time: again because time is scarce, one might naturally expect partners who work longer hours in the formal market to work fewer hours in unpaid labor. As analysis often proceeds with annual or weekly earnings, which necessarily encompass both earnings power and hours worked, distinguishing between power and time constraints is difficult. A third complication is that many housework tasks can be outsourced – for example, maids can be hired and restaurant meals can be bought – which muddies the interpretation of the proportion of time each partner spends on housework as truly reflective of his or her relative bargaining position within the relationship. Fourth, most of the literature relies on cross-sectional data to model housework time, as information on time use is rarely available in panel form.<sup>3</sup> To the extent that earnings today are a proxy for lifetime earnings, cross-sectional analysis will capture the effect of relative lifetime earnings on housework time. However, unobserved individual/couple-specific factors that are correlated with earnings (or any covariate) will bias cross-sectional results.

In general, many possible individual/couple-specific factors might influence housework time. Consider, for example, that the time spent on housework is a measure of an input to housework production, and different individuals may complete a given housework task in different amounts of time. If those who are more productive in the home are also more productive in the market, then they would be expected to earn higher wages, and estimates that fail to control for such differences in home productivity will overstate the impact of

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<sup>1</sup> Stancaelli and Stratton (2014) present evidence from the UK and France that cleaning, ironing, laundry, and doing dishes are in fact not very enjoyable tasks. More people enjoy cooking. The same has historically also been true in the US (Ramey 2009). The results in Rapoport et al. (2011) support the claim that time spent outside paid work is not pure leisure, and Connelly and Kimmel (2015) further show that on average, routine housework tasks are not enjoyed any more than paid work.

<sup>2</sup> An alternative interpretation of a negative relation between earnings and housework time is that partners’ relative wages reflect their comparative advantages, such that the partner with the highest market-based opportunity cost has a comparative advantage in performing paid as compared to unpaid labor.

<sup>3</sup> One exception is Baxter and Hewitt (2013).

higher earnings on housework time. Couples may also have different preferences regarding home-produced versus market-purchased goods. If individuals who prefer market-purchased goods are more likely to be in paid employment, then focusing only on couples who both work for pay may introduce a sample-selection bias. Heterogeneity across couples in housework time allocation may also exist due to individual/couple-specific preferences regarding household production tasks and gender role attitudes. Research suggests that such couple-specific factors do matter (see Stratton 2012 for evidence regarding preferences, and Greenstein 1996 and 2000, Cunningham 2008, and Baxter and Hewitt 2013 for evidence regarding attitudes). These complications mean that a clean identification of the ‘spousal power effect’ on the intra-household division of unpaid labor using cross-sectional data has been elusive.

The fact that women spend substantially more time on housework even in households in which the partners appear to have equal economic power (e.g., as in Álvarez and Miles 2003) also suggests that something about gender is important. Various hypotheses have been floated in the sociology, demographic, and economic literatures that could explain the role of gender. One such explanation is that women who earn more money in the formal market than they feel is socially acceptable will try to compensate for this supposed transgression by performing more labor in the home (Killewald and Gough 2010), otherwise termed ‘doing gender’ (West and Zimmerman 1987; Brines 1994; Bittman et al. 2003). Another hypothesis is that institutional constraints present in the wider society (including workplaces) push households to specialize more than they would like to do (as discussed in Pedulla and Thebaud 2015).

By using gender-specific, difference-in-difference and couple-fixed-effects models, we control not only for unobservable couple-specific, time-invariant factors that may bias cross-sectional estimates, but also for the average expected economic balance of power within each household, without the need to rely on earnings measures. As such, our models are estimable on samples irrespective of individuals’ labor market status and earnings reports. By then focusing on the impact of promotion and termination events that potentially provide new information regarding each partner’s value in the labor market, these models allow us to identify more cleanly how unpaid work hours respond to updated information about individuals’ relative economic power.

A complication arises because paid work time changes on average with these labor market events. While own and partner’s paid work time are important controls according to time availability theory in sociology (see Shelton and John 1993 for a discussion) and have frequently been included in analyses of housework time, economic theory suggests that paid time is endogenously determined with unpaid work time (Jenkins and O’Leary 1995). A number of papers use instrumental variables techniques to address this problem (including Bredtmann 2014 for Germany and Connelly and Kimmel 2009 for the US), with mixed results. Bredtmann finds that, for both men and women, the more time an individual spends in paid labor, the less time he/she spends in unpaid labor. Connelly and Kimmel only find time constraints to be significant for women. Bredtmann finds that the more time he spends on paid labor, the more time she spends on unpaid labor, while Connelly and Kimmel find the opposite result.<sup>4</sup> Neither paper reports finding a significant association between her paid labor time and his unpaid labor time. Both of these papers rely on cross-sectional data and include controls for hours spent in multiple activities.

Our reliance on fixed effects eliminates gender and couple-specific, time-invariant factors including earnings power that influence time use both within and outside the home. We find that the labor market events (promotions/terminations) we observe are associated with changes in paid work time, and we posit that couples must adjust to both this “mechanical” change in time availability, as well as the change in relative economic power signaled by the labor market event.<sup>5</sup> We estimate models with and without controls for each partner’s paid work time. Models without controls for paid work time are effectively reduced-form specifications in which the coefficients associated with the labor market events capture the effects of both mechanical

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<sup>4</sup> In sensitivity analysis where she drops those unpaid labor activities most likely to be utility-generating, Bredtmann (2014) also finds a negative relation between his paid labor time and her unpaid labor time.

<sup>5</sup> Simple labor supply models assume individuals are free to choose how many hours to supply to the labor market. Here we assume instead that individuals accepting a job or a promotion must simultaneously accept the hours the employer offers as part of that new position.

adjustments and changes in relative power driven by the new information these events provide. Adding controls for paid work time then is a means of capturing the mechanical work-time adjustment component, allowing us to isolate the effect of the change in the intra-household balance of power on household time allocations.<sup>6</sup> Guided by our initial results, we also look for evidence of concomitant changes to the use of market-based substitutes for household time (i.e., outsourcing) when labor market events occur. Finally, we look for heterogeneity in our main effects among subsamples of the data, in particular asking whether couples with more conservative gender-role attitudes respond differently to the potentially new information provided by labor market events.

## 2. Conceptual framework

An economic approach to the problem of time allocation at the level of the whole household takes as given that every household possesses resources (i.e., adult male and adult female time), faces constraints (i.e., only 24 hours in a day, plus some need for sleep, recreation, and so on), and chooses to allocate its resources such that an objective function is maximized subject to those constraints. The form of this objective function is the subject of some debate (see Lundberg and Pollak 1996 for a partial review). Common preference or household utility models have lost ground in favor of cooperative and non-cooperative bargaining models that continue to highlight each partner's individual preferences as well as outside opportunities. Arguments in these functions typically include goods consumption and leisure time at the individual level, as well as such 'public' goods as children and household production.<sup>7</sup>

We propose a simple framework in which households require some basic amount of goods and services that can be produced using the household couple's unpaid labor in the home<sup>8</sup> or, at least in part, can be contributed by others outside the couple (such as maids or restaurant chefs). We exclude childcare from our concept of housework<sup>9</sup> and focus on routine housework tasks that are undertaken in every household, can be competently performed by either gender, and arguably produce goods that benefit household members: doing the laundry, cooking, and cleaning. We refer to the total quantity of housework time that a household couple in combination spends as  $H$ . Of this total, a portion is contributed by the man and a portion by the woman, denoted  $H_m$  and  $H_f$  respectively, portions we will refer to subsequently as "his" time and "her" time.

Let  $\bar{H}$  equal the minimum amount of total housework time in hours that the household couple would need to spend to produce the foundational goods that the household requires, assuming maximally efficient production and no other source of production for these goods. In practice,  $\bar{H}$  will be a function of the composition and productive ability of the household (e.g., the number and ages of children present). Then,

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<sup>6</sup> Importantly, when we include controls for paid work time, we do not interpret the estimated coefficients on those controls as causal. This is because despite our inclusion of fixed effects, these estimates will still be afflicted by endogeneity to the extent that individuals simultaneously change their allocation of time to different uses for the same unobserved third-party reason (see Jenkins and O'Leary (1995) for a more detailed discussion of the endogeneity problem). Nonetheless, to the extent that the unobserved third-party factors influencing time allocations to both activities are independent of the labor market events we observe, including controls for paid work enables us to interpret the coefficients on those events as picking up something other than mechanical housework-time adjustments.

<sup>7</sup> On a more basic level, however, the goal is presumably happiness. The role of factors such as personal beliefs and social pressure as inputs to the happiness produced by one's household environment and choices has received relatively little attention in the economics literature.

<sup>8</sup> Throughout the paper we will use the term "household couple" to refer to the two adults – one male and one female – who together form the base of each household in our sample.

<sup>9</sup> We exclude childcare for a variety of reasons: childcare is frequently multitasked (often with leisure), it is extremely time-consuming compared to other types of household labor, it is to some degree more efficiently performed by women (e.g., when feeding a nursing baby is involved), and it is virtually impossible to completely outsource. It also produces public goods of a very different, emotionally-laden sort (i.e., happy, functional children) than other types of household labor. Empirical work by Kimmel and Connelly (2007) yields evidence that the explanatory factors associated with childcare are in fact quite different from those associated with housework.

$$H = \bar{H} - O + excess$$

$$H_m + H_f = \bar{H} - O + excess$$

where  $O$  is the household time saved by outsourcing some of the production, and *excess* is the amount of excess time spent on housework tasks by the household couple that is not in fact needed in order to produce the required quantity of foundational goods. This *excess* quantity of time may arise for a number of reasons, including ignorance about efficient production methods or direct utility that is derived by one or both members of the household couple from above-minimum time spent in the production of the foundational goods (e.g., ‘house pride’ derived from psycho-social pressure, a sense of purposefulness derived from expanding a set amount of work to ‘fill’ the time available in one’s schedule, or the simple enjoyment of housework activities like cooking).<sup>10</sup>

The total person-hours available in a day are fixed at  $\bar{T}$  for the household couple combined, and each hour can be allocated to one of a number of possible uses. For simplicity we do not attempt in this paper to examine or model all such possible uses, but rather focus on three categories of activity: housework tasks of the sort described above, paid work tasks, and everything else (including sleep, leisure, personal care activities, eating, child care, other forms of housework, and any other possible use of time). We can thus write

$$H = \bar{T} - L - E$$

where  $L$  indicates paid-work (“labor”) time and  $E$  indicates all other (“extra”) uses of time. Combining this equation with the one above yields the full time-allocation identity at the household level of

$$\bar{T} - \bar{H} \equiv L + E + excess - O$$

In this set-up, just as  $H$  has a component that is attributed to the man and one that is attributed to the woman ( $H_m$  and  $H_f$ ), so too are there gender-specific portions of  $L$ ,  $E$ , and *excess*, while  $O$  is a household-level choice variable. All variables except those capped by bars are in principle choice variables, although the actual time spent on housework by each partner includes any *excess* time and is net of outsourcing.

An economist would assume that the allocation of housework time across partners within a household is made optimally, taking into consideration both the paid work time and the opportunity cost of each spouse’s time: *ceteris paribus*, the spouse with more paid work time would be expected to do less housework, while the spouse with a higher opportunity cost (often proxied in economics by the wage s/he could earn in market work) would also be expected to do less housework. This latter prediction is analogous to the prediction that workers with fewer outside alternatives (i.e., lower opportunity costs) are more likely to accept lower wages from prospective employers, or that monopolists can get away with charging higher prices for lower-quality products than would be possible in a more competitive market where consumers have cheaper outside options. The role of opportunity costs could, of course, be moderated based on preferences and attitudes.

Suppose now a labor market event occurs, such as a plant closure or redundancy or a promotion. Such events often alter paid work time and, given a fixed time allocation, the household must subsequently adjust to accommodate that change for mechanical reasons – i.e., since

$$H = \bar{T} - L - E$$

and since  $\bar{T}$  does not change, an increase (say) in  $L$  – the total labor time of the household couple – mechanically implies a *ceteris paribus* decrease in  $H$  and/or a decrease in  $E$ . Total housework time can decrease by outsourcing more housework or by decreasing *excess* housework time – whether through technological improvements, reductions in psycho-social pressure, or substitution away from housework as a source of

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<sup>10</sup> The *excess* term in our model also accommodates such psycho-social motivations as ‘doing gender’.



utility.<sup>11</sup> But how is this accomplished? Specifically, which elements of the above equation are manipulated, and does the manipulation occur within person (i.e., with an increase in  $L_f$ , say, being associated with a decrease in  $excess_f$  and/or  $E_f$ , but no increase in  $H_m$ ) or is it distributed across the two partners?

This simple framework allows us to perform various thought experiments that illustrate how households might adjust their time allocations when one partner faces an exogenous increase or decrease to his or her paid work hours. If the household operates as a unit, is at the frontier of housework technology, and derives no utility benefit from performing housework, then an economist would predict that a change in paid work time for partner A would result in a re-distribution of housework time such that partner A does more (if paid work time falls) or less (if paid work time increases), with a compensating adjustment either to the quantity of outsourcing or to partner B's housework time allocation. If partner B's housework time allocation rises as a result, then the additional time s/he spends on housework must be taken away from some other activity. If partner B's housework time allocation falls as a result, then the time s/he previously spent on housework must be allocated to some other activity.

If by contrast one or both partners initially spend some *excess* time on housework, then an exogenous increase in  $L$  may be accommodated at low (or no) cost by the partner who originally spent more *excess* time on housework.

While capturing the important economic dimensions of time scarcity, technology, and utility, the discussion thus far does not address the intra-household power and bargaining dimensions of time use that have been the focal point of much prior work (see, for example, Grossbard-Shechtman 1984, 2003; Hersch and Stratton 1994; Lundberg and Pollak 1996; Grossbard-Shechtman and Amuedo-Dorantes 2007). While labor market events such as promotions and redundancies that influence paid work time necessitate a mechanical adjustment in time use, unexpected labor market events can also trigger changes in bargaining power by altering career trajectories and concomitant economic opportunities. A partner who, say via a promotion, now has more economic power within the household may be able to push a greater share of  $H$  onto his or her partner, holding paid labor time constant.<sup>12</sup> Following this logic, we will ask in our empirical models whether the power-relation aspect of a labor market event (e.g., a layoff that arguably reduces the relative bargaining power of the partner who was laid off, or a promotion which increases the power of the one promoted) impacts the way in which housework time allocations adjust, independently of the mechanical adjustments made due to time scarcity.

Similarly, partnerships that place economic weight on gender itself (for example, those in which partners believe that men should engage in paid work and women should take care of the house) may respond to these labor market events differently than more egalitarian-minded households. For example, women in households that view gender *per se* as an important input to optimal time allocation may be less able than other women to bargain for a reduction in their housework hours, even if they get promoted.

### 3. Method

We begin by presenting some basic descriptive information for our sample of Australian couples, documenting the observed gender gaps in both paid work time and housework time, and running naïve regression models of the trade-off at the household level between total work time and total housework time in our data. We then explore the extent to which the labor market events we examine are associated with changes in each type of time use, using both regression models – OLS and IV, the latter to explore the viability of using labor market events to instrument for paid work time in models of housework time – and simple differencing. Next, we estimate a series of couple-specific fixed-effects models that account for possible confounding factors and treat paid labor market events not as instruments for work time, but as exogenous shifters of economic power over and above

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<sup>11</sup> Either technological improvements or psychological/social factors may result in households accommodating changes in their paid labor time through changes in the fraction of housework performed in a multitasking, as opposed to sole-tasking, context. In the present paper we acknowledge this possibility, but we do not separately measure sole-tasked and multitasked household work (see Kalenkoski and Foster 2016 for further discussion of the multitasking of unpaid activities).

<sup>12</sup> We view economic power as a broad concept that encompasses, but is not restricted to, market wages.

their association with work time. The fixed effects control for all individual and couple-specific, time-invariant factors influencing the time spent on housework, such as stable preferences, productivity, attitudes, and baseline power considerations. Time use will, nonetheless, change with changing needs and resources. Thus, we control for changes in household structure and composition, residence, year, and non-labor income. To distinguish between the effect of labor market events via their mechanical impact on paid work time and their effect via changes in bargaining power, we estimate specifications with and without controls for paid work time. In the context of our fixed-effects specifications, a labor market event must provide new information to the household in order to impact bargaining power, and if bargaining power does shift, then there should be a lasting effect on time allocations. We accommodate this possibility in some equations by estimating separate short-run and long-run effects. After examining HILDA's limited data on outsourcing, we explore potential heterogeneity across households in their response to labor market events, using observable aspects of households that could signal beliefs about gender roles.

#### 4. Data

We use panel data drawn from the 2001-2014 waves of the Australian Household Income and Labour Dynamics in Australia (HILDA) survey (see Watson and Wooden 2012 for a description). The analysis is restricted to single-family, mixed-gender couple households (married or de facto) of working age.<sup>13</sup> Observations in which a partner fails to complete the self-completed questionnaire on which housework time is reported are excluded,<sup>14</sup> as are couples with only one year of data. Motivated by prior findings indicating the potential for different unpaid-labor dynamics depending upon whether the woman participates in the labor market (e.g., Zamora 2011), we not only present analyses separately by gender but also report most results separately for the entire analysis sample and for the subsample of household-year observations in which both partners are engaged in paid work for at least two years, referred to as the "dual-earner" sample.

Time spent on housework is collected as the response to the question, "How much time would you spend on housework (preparing meals, washing dishes, cleaning house, washing clothes, ironing and sewing) in a typical week?"<sup>15</sup> Observations in which either partner fails to report housework time, or in which the couple jointly reports either no time or more than 70 hours (approximately the 99th percentile), are dropped. The frequency with which individuals reply 'no time' is sufficiently uncommon (less than 0.4% for women and less than 7% for men) to make nonlinear estimation unnecessary.

Significant labor market events are defined at the person level and include either being terminated (fired or made redundant) or being promoted (defined to include changing jobs without having been terminated) within the prior year. Information on these events is not available in 2001 and is missing for another 1% of the sample. We assume no event occurs in these cases. Such errors-in-variables will have a tendency to bias our estimates toward zero. To minimize this bias, we exclude couples for whom data from only 2001 and one other year are available.<sup>16</sup>

Table 1 presents sample statistics. Panel A shows that there are more than 30,000 observations on 4828 couples in the full sample, and more than 20,000 observations on 3652 couples in the dual-earner sample. Were we to restrict the sample to those dual-earner couples who report wages, the number of couples would decline by a further 20% and the number of observations by 30% (to 2895 couples and 13,836 observations). While there are on average 6.3 observations per couple in our full analysis sample (5.7 in the dual-earner sample), Panel A

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<sup>13</sup> We exclude persons younger than age 20, men older than age 64, women older than age 61, and 20-to-23 year olds enrolled full-time in higher education. The different age restrictions by gender approximately reflect the different ages at which men and women are eligible to receive pensions in Australia.

<sup>14</sup> Observations missing data on our explanatory variables are also dropped. The variables most likely to be missing data are non-labor and gift income. Paid work time is missing for a small number of observations and is top-coded at 80 hours for men and 65 hours for women, approximately the top decile in each case.

<sup>15</sup> This question is answered to the nearest minute in all HILDA waves except the first; in 2001, it is answered to the nearest hour. In our models, any difference in the average measured quantity of housework caused by this change in granularity across reporting years is captured by year dummies.

<sup>16</sup> Our results are robust to excluding all 2001 observations.

shows that the distribution for both samples is skewed towards shorter durations. In part this is attributable to the addition of a new random sample of households in 2011 that could be interviewed at most four times; in part it also reflects the fact that couples can form and dissolve at any time during the survey period.<sup>17</sup>

Panel B of Table 1 shows within-couple means for the key variables in our analysis: housework time, paid labor time, and the two types of labor market events. These are presented for the household as a whole as well as for each partner separately. Here we see that total household time spent on housework is about 9% (or 2 hours) lower for dual-earner couples, while total time spent on paid labor is about 22% (or 14 hours) higher, compared to the corresponding figures in the full sample. This is initial evidence that there is not a one-for-one trade-off between paid and unpaid labor for these populations. Not surprisingly, terminations are less frequent than promotions, and the latter are more common amongst dual-earner couples, particularly for women. Gender differences are as expected, with men reporting substantially less time on housework and substantially more time in paid labor compared to women. The average numbers of promotions and terminations are quite similar across gender, particularly for dual-earner households. Finally, Panel C of Table 1 shows means by couple for the other explanatory variables included in the ensuing regression analysis, with the exception of state and year dummies.<sup>18</sup>

Table 1  
Sample Characteristics at the Couple Level

Panel A	<u>Full Sample</u>	<u>Dual- Earner Sample</u>
Number of Couples	4828	3652
Number of Observations	30,659	20,729
% Couple Spells with 2 Observations	19.96	23.08
% Couple Spells with 3 Observations	17.21	19.27
% Couple Spells with 4 Observations	16.12	15.09
% Couple Spells with 5 Observations	8.20	8.69
% Couple Spells with 6 Observations	6.81	7.22
% Couple Spells with 7 Observations	5.69	5.10
% Couple Spells with 8 Observations	3.93	3.98
% Couple Spells with 9 Observations	3.69	3.59
% Couple Spells with 10 Observations	3.47	3.29
% Couple Spells with 11 Observations	3.29	3.01
% Couple Spells with 12 Observations	3.12	2.86
% Couple Spells with 13 Observations	3.79	2.49
% Couple Spells with 14 Observations	4.73	2.32

<sup>17</sup> In order to test whether the effect of labor market events on housework time is temporary or more permanent, it is necessary to have information pertaining to events in consecutive years. Some couples have gaps as a result of missing interview data. To accommodate such couples, we treat the pre- and post- gap data as if they were from distinct couples – referring to these as ‘couple spells’. Thus, in estimating our fixed-effects models we actually have 5416 fixed effects in the full sample and 4016 fixed effects in the dual-earner sample. The distribution of spell lengths reported in Table 1 is constructed for these couple spells rather than for couples *per se*. This complication also skews the distribution towards shorter durations.

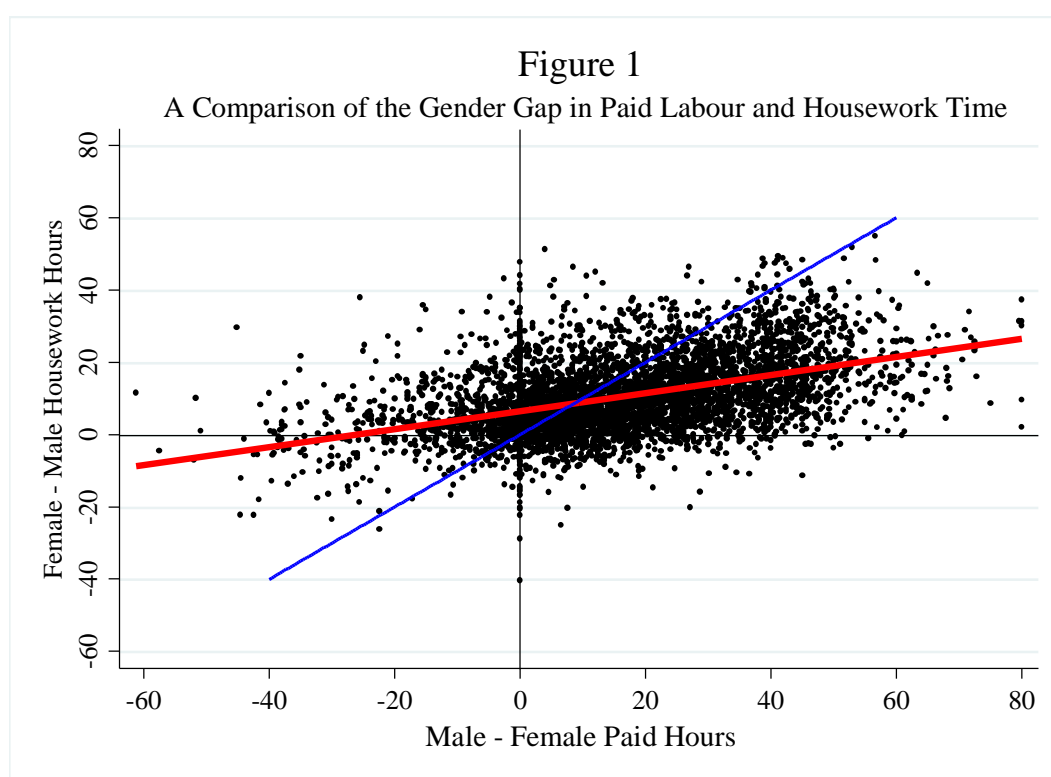
<sup>18</sup> Ideally we would like to also be able to control for each partner’s wealth, which likely also influences intra-household bargaining power. Unfortunately, data on asset ownership are only available every fourth year in HILDA, and requiring such information would substantially alter the sample composition.

Panel B	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
Couple's Average Housework Time	22.68	9.83	20.58	8.99
Couple's Average Paid Labor Time	62.59	24.17	76.29	15.44
Couple's Average # of Terminations	0.07	0.15	0.05	0.14
Couple's Average # of Promotions/Job Changes	0.38	0.39	0.44	0.42
His Average Housework Time	6.05	4.50	5.96	4.04
His Average Paid Labor Time	39.41	15.42	44.51	9.94
His Average # of Terminations	0.04	0.12	0.03	0.11
His Average # of Promotions/Job Changes	0.20	0.25	0.21	0.26
Her Average Housework Time	16.63	9.24	14.62	8.21
Her Average Paid Labor Time	23.18	15.69	31.79	11.40
Her Average # of Terminations	0.02	0.09	0.02	0.08
Her Average # of Promotions/Job Changes	0.18	0.24	0.23	0.27

Panel C	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
Married	0.72	0.41	0.72	0.41
# of Children Age 0-4	0.35	0.53	0.25	0.45
# of Children Age 5-9	0.26	0.45	0.25	0.44
# of Children Age 10-14	0.26	0.47	0.28	0.48
# of Other Dependents	0.20	0.40	0.22	0.43
# of Other Adults	0.16	0.36	0.16	0.34
He is Disabled	0.13	0.27	0.08	0.20
She is Disabled	0.12	0.26	0.08	0.21
Have a Disabled Child	0.05	0.16	0.04	0.13
Have another Disabled Resident	0.04	0.13	0.03	0.13
He is Enrolled Full-Time in Education	0.02	0.09	0.01	0.08
She is Enrolled Full-Time in Education	0.03	0.11	0.02	0.09
Lives in a Major City	0.66	0.46	0.67	0.45
Lives in another Urban Area	0.21	0.38	0.20	0.38
Owns (versus Rents)	0.72	0.40	0.75	0.38
Live in a House	0.84	0.32	0.84	0.32
Live in a Townhouse	0.10	0.25	0.10	0.25
Lives in a Flat	0.06	0.19	0.06	0.19
Moved in last year	0.18	0.23	0.17	0.23
His Non-labor Income (1000 AU\$2014)	1.10	3.17	1.09	2.88
Her Non-labor Income (1000 AU\$2014)	0.86	2.55	0.79	2.34
His Gift Income (1000 AU\$2014)	1.87	17.79	2.09	20.40
Her Gift Income (1000 AU\$2014)	1.62	9.56	1.63	9.92

A concern often raised regarding the use of survey data on housework time is its accuracy. Time-diary data are generally held to be more accurate than survey data (Robinson 1985), but time-diary data are not readily available in panel form, either in Australia or in any other country. To gauge the reliability of the survey measures reported in HILDA, we calculated the average time spent on housework (specifically cooking, cleaning, laundry, ironing, and dishwashing) for a similar sample of couples from the 2006 Australian Time Use Survey. Converted to weekly figures, these time diary data indicate mean housework time to be 21.6 hours at the household level, 4.6 hours for men, and 17.0 hours for women; the comparable figures in our data are 22.7, 6.0, and 16.6 hours, respectively. While men in our HILDA sample may be overstating their housework time (and in fact there is evidence that women provide more accurate survey responses (Lee and Waite 2005)), these time-diary measures suggest that the HILDA data on housework time are on average quite reasonable.

A common explanation for the gender gap in housework time points to the gender gap in paid labor time. We illustrate in Figure 1 the relation between the male-female paid labor time gap and the female-male housework time gap. Each point represents the average of the gaps observed for a single couple across all years of observation.



The majority of observations in Figure 1 fall in quadrant 1, where men have more paid labor hours and fewer housework hours than women. While there is a distinct positive relation suggesting a trade-off between hours of paid work and hours of unpaid work, in practice that trade-off (illustrated by the red line) is clearly less than one-for-one (depicted by the 45-degree line, shown in blue). Each additional hour that she works relative to him is accompanied by a reduction in her housework time relative to his by only about a quarter of an hour, implying that a portion of the housework time gap between the genders remains even as the paid work time gap falls. In addition, as illustrated by the y-intercept of the red line, women contribute more time to housework (6.5 hours more on average) than men do even when working the same number of hours for pay. Most of the data falls below the 45-degree line. If these were the only two productive activities that adults engaged in, this would imply that on average men in Australia spend more time in productive labor, broadly defined, than women.<sup>19</sup> However, with childcare unaccounted for in the figure, this conclusion would be premature, as prior findings

<sup>19</sup> Burda et al. (2013) provides evidence that in rich, non-Catholic countries, men's and women's productive work hours are approximately equal.

using Australian data indicate that women perform significantly more childcare than men (Kalenkoski and Foster 2008).

As noted above, a key focus of prior literature has been on the relation between hourly earnings and housework time allocations. Focusing on the sample of couples who both report hourly earnings, we compare the relationship between the gap in housework time and both the gap in paid work time and the gap in wages. While the slope of the relation between the two hours measures remains virtually identical to that shown in Figure 1 (0.24 compared to 0.25), the slope of the relation between the wage gap and the housework time gap while significant is small (0.076). Given that the standard deviation of the male-female paid work time measure (14.31) is almost identical to the standard deviation of the male-female hourly wage measure (14.50), these results indicate that the relationship between hours of paid work and housework hours is stronger than that between wages and housework hours, presumably due to the time-scarcity constraint faced by every individual.

We examine further the relation between his and her paid labor and housework time gaps in Table 2. At the top of the first column of Table 2 we replicate the slope coefficient shown in Figure 1, and then, moving down the column, we show what happens to that coefficient estimate in different estimation scenarios. We first weight the observations by frequency of observation, which makes little difference. We then add covariates, which causes the coefficient to drop to 0.21. Next, we experiment with what would happen if we used the labor market events described earlier to instrument for the couple’s paid work time gap. As shown in the row labelled “OLS IV”, this results in a slope coefficient of about 0.32. Adding fixed effects to the basic OLS specification reduces the coefficient estimate by about 25%, and instrumenting for the paid labor time gap in that FE specification, again using labor market events, results in a coefficient of about 0.18.

Notably, while the first-stage results of these IV specifications indicate that labor market events are strong instruments for paid work hours (see the partial F-statistics reported in Column 3 of Table 2), Column 4 shows that in both OLS and FE specifications we soundly reject the null hypothesis that the labor market events themselves should not appear in the second-stage equation, using the standard Sargan-Hansen test. This implies that some aspect of these labor market events, over and above their association with changes in paid work hours, influences couples’ housework time allocations. We interpret this aspect as a shift in relative economic power within the couple.

Table 2  
Modelling the Gender Gap in Housework Time  
Her - His Housework Time

<u>Specification</u>	<u>His - Her Paid Time (Std Error)</u>		<u>Constant (Std Error)</u>		<u>First Stage Partial F-Test (P-Value)</u>		<u>Sargan-Hansen Test of Overid. Restrictions (P-Value)</u>	
OLS from Figure 1 No covariates	0.2495 *** (0.0075)		6.5240 *** (0.1763)					
WOLS from Figure 1 No covariates	0.2606 *** (0.0078)		6.6216 *** (0.1890)					
OLS	0.2128 *** (0.0032)		3.0701 *** (0.4326)					
OLS IV	0.3249 *** (0.0225)		2.2255 *** (0.4715)		167.77 *** (0.0000)		105.32 *** (0.0000)	

FE	0.1550 ***		4.8859 ***			
	(0.0041)		(0.7690)			
FE IV	0.1850 ***		4.7444 ***	146.37 ***	23.15 ***	
	(0.0274)		(0.7805)	(0.0000)	(0.0000)	

Figure 1 results are based on couple-specific sample means. The WOLS figures use weights to control for the different number of observations per couple.

All except Figure 1 results include year dummies and all the covariates reported in Panel C of Table 1.

Asterisks indicate statistical significance: \*\*\* 1%, \*\* 5%, \* 10%.

The asterisks for column 1 denote the level of significance for a 2 tailed test against a null of zero. The indicated level of significance using a null of one is identical.

IV results instrument for his-her paid work time using information on his and her promotions and terminations

Yet, viewing labor market events as a direct determinant of housework time, and including them in a housework time equation, hinges on the assumption that these events are not themselves endogenously caused by changes in housework time. It is feasible that people who are gunning for a promotion may spend less time on housework in the lead-up to that promotion. To investigate this possibility, we estimate models of labor market events as a function of prior changes in housework time. Specifically, we examine whether events occurring between year  $t$  and year  $t+1$  are a function of changing housework time between year  $t-1$  and year  $t$ , and whether events occurring between 6 and 12 months ago are a function of changing housework time between 24 and 12 months ago, controlling for other changes that might cause changes in housework time, such as household composition.<sup>20</sup> Results (see Appendix Table A) indicate that past changes in housework time are not predictive of future labor market events, with the possible exception that women in dual-earner households who increase their housework time are more likely to be terminated at some point in the subsequent year.<sup>21</sup>

## 5. Nonparametric simple difference and difference-in-difference results

Panel A of Table 3 shows simple tabulations for our full sample that exploit the panel nature of our data to illustrate how total household housework time and paid labor time, as well as men's and women's individual housework time and paid labor time, change on average in the year following gender-specific employment events. We can see that for both men and women, promotion is associated with more paid work by the household, while termination is associated with less. In addition, there are significant compensatory differences in household housework hours with all labor market events except men's promotion. These changes are not, however, equally shared within the household. The partner who directly experiences the labor market event adjusts his/her time the most.<sup>22</sup> Women's labor market events have the largest and most significant effects on housework time. Their partners generally act to compensate (such that when her housework time rises/falls, his falls/rises) but these cross-effects are of a smaller magnitude.<sup>23</sup> These findings support an analysis of individual time use rather than of the gender gap in time use.

<sup>20</sup> Note that our fixed-effects specification already accommodates, via those fixed effects, individuals who consistently spend less time on housework in order to increase their chances of promotion.

<sup>21</sup> As more than twenty equations are estimated, it is not unexpected to find one coefficient significant at the 5% level.

<sup>22</sup> The finding of increases in housework time for those who are terminated is broadly consistent with the findings of Krueger and Mueller (2012) and Burda and Hamermesh (2010) that unemployment is associated with more time being allocated to housework.

<sup>23</sup> That his housework time rises less than hers following a termination is in line with findings by Gough and Killewald (2011).

In Panel B of Table 3, we perform a difference-in-difference analysis comparing these changes in time use to those observed in households in which neither partner experienced a labor market event. Results are similar if the comparison is to households in which the particular partner did not experience a labor market event, but somewhat cleaner with this more restrictive comparison group since the possibility that one partner has changed jobs to accommodate a move by the other partner has been ruled out. This difference-in-difference analysis yields a similar pattern to that observed in the simple tabulations, though partners' responses are generally weaker and less significant.

When the sample is restricted to dual-earner couples (see Appendix Table B) the changes in paid work time are similar, but of a smaller magnitude, while housework time only changes significantly for women who are promoted. Total housework time in dual-earner households does not adjust significantly in response to anyone's labor market events.

In sum, two findings stand out. First, own paid work time clearly changes with labor market events. Thus, household time use must adjust to compensate, and each member of the couple may adjust to a different degree. Second, housework time appears more responsive to labor market events in households where one spouse is currently not generating labor income. This responsiveness may arise because these households possess the mechanical capacity to adjust or, in the language of our model, they may have more *excess* time available to take away from or devote towards housework. Alternatively, it may be that compared to more 'traditional' couples, dual-earner couples are already using more housework outsourcing services, and hence may be constrained in their ability to hire even more such services (e.g., because housework activities are difficult to outsource beyond a certain number of hours per week unless one has a live-in maid). Dual-earner couples must then manage the changes in paid work time that accompany significant labor market events by sacrificing time devoted to other activities, rather than through adjustments to their personal housework hours. We also find statistical evidence that labor market events are associated with changes in housework time over and above their impact on paid labor time, suggesting that these events may provide new information that changes bargaining power within the household.

Table 3  
Simple Difference and Difference-in-Difference Results  
Full Sample

Panel A:	Simple Difference							
	He was				She was			
	Promoted/ Changed Jobs		Terminated		Promoted/ Changed Jobs		Terminated	
Household Paid Time	1.09	***	-9.72	***	3.06	***	-8.12	***
His Paid Time	1.75	***	-9.45	***	0.13		-0.74	
Her Paid Time	-0.65	***	-0.27		2.93	***	-7.38	***
Household Housework Time	0.20		0.94	**	-0.50	***	1.36	**
His Housework Time	-0.16	*	0.77	***	0.18	*	-0.23	
Her Housework Time	0.36	**	0.17		-0.68	***	1.59	***
Panel B:	Difference-in-Difference							
Household Paid Time	2.10	***	-8.71	***	4.07	***	-7.11	***
His Paid Time	2.24	***	-8.95	***	0.63	***	-0.24	
Her Paid Time	-0.14		0.24		3.44	***	-6.87	***
Household Housework Time	0.06		0.81	*	-0.63	***	1.23	**
His Housework Time	-0.20	**	0.72	***	0.14		-0.27	



Her Housework Time	0.27	0.08	-0.76	***	1.50	***
# of Observations	4313	856	3757		541	

## 6. Fixed-effects regression results

In order to control for other changes in the household over the past year that might influence housework time allocation, we now estimate fixed effects models of total, his, and her housework time as a function of the labor market event variables.<sup>24</sup> In addition to couple-specific fixed effects, we control for a range of household structure variables (number and ages of household members); indicators for the presence of disabled people in the home, for partners engaged full-time in school, urbanicity (non-urban (base category), major city, and other urban), and type of home (apartment (base category), house, or townhouse); reported non-labor income (the sum of interest, dividend, and royalty income) and gifts (the sum of inheritances, gifts and other irregular income) received by each partner; as well as year and state of residence dummies.

Table 4A shows the results for the full sample and Table 4B for the dual-earner sample. The full set of parameter estimates (less the state and year effects) is reported in Appendix C for Table 4A and in Appendix D for Table 4B. Columns 1 and 2 of each table model total housework time, columns 3 and 4 his housework time, and columns 5 and 6 her housework time. The even-numbered columns differ from the odd-numbered columns in that we add to the latter specifications controls for the paid work hours of each partner. Panel A of each table shows the results under the assumption that labor market events have only a short-run effect; Panel B accommodates a longer-run impact.

The results reported in Panel A not controlling for paid work time (columns 1, 3, and 5) are much like those obtained in the simple difference-in-difference analysis. In the full sample, those who are promoted (terminated) subsequently perform less (more) unpaid work; in the dual-earner sample, the effects are in the anticipated direction but not significant. The only significant cross-partner effect is that her promotions increase his reported time spent on housework for both samples.

As changes in paid work time may be endogenously determined with changes in housework hours even in this fixed effects specification, the coefficient estimates in columns 2, 4, and 6 should be interpreted with caution.<sup>25</sup> That said, the controls for paid work time are highly statistically significant, pointing to the importance of the mechanical time constraint, but with a trade-off that is substantially less than one-for-one. Were we to take our results for the full sample at face value, for each additional hour he spends in paid employment, he spends about four minutes less on housework; for each additional hour she spends in paid employment, she spends about nine and one-half minutes less on housework. Dual-earner couples also adjust their own housework time, but about 20-25% less. A natural inference is that time spent on other activities accommodates most of the change in paid work time, particularly for dual-earner couples. Furthermore, the results indicate that while total housework time does decline as paid work time rises, partners compensate for much of the mechanical change in housework time – men making up about 28% of their partner’s and women making up about 60% of their partner’s paid-time-induced change in housework time. Overall these results support our supposition that households have some relatively fixed need for housework that adjusts only in part to changes in paid work time, and that dual-earner households appear to adjust less than non-dual-earner households. Once again, however, endogeneity concerns imply the need to be cautious of these interpretations.

<sup>24</sup> The household effect is literally the sum of his effect and her effect.

<sup>25</sup> An instrumental variables strategy could be used to control for the possible endogeneity of labor market hours in determining housework time, but as in many complex empirical settings, it is difficult if not impossible to identify appropriate instruments. We are not aware of any policy changes that could be used and, as illustrated earlier, the labor market events themselves do not satisfy the necessary conditions either.

Table 4A  
Fixed Effects Estimates of the Time Spent on Housework  
Full Sample

Panel A	By the Household			By Men			By Women		
	(1)	(2)	(3)	(4)	(5)	(6)			
His Paid Work Time		-0.0290 *** (0.0062)		-0.0697 *** (0.0037)		0.0407 *** (0.0056)			
Her Paid Work Time		-0.1141 *** (0.0064)		0.0434 *** (0.0032)		-0.1575 *** (0.0059)			
He was Promoted Last Year	-0.1741 (0.1545)	-0.2154 (0.1531)	-0.1537 (0.0782)	** -0.1422 (0.0767)	* -0.0204 (0.1399)	-0.0733 (0.1372)			
She was Promoted Last Year	-0.5303 *** (0.1591)	-0.1975 (0.1562)	0.3311 *** (0.0827)	** 0.1992 (0.0810)	** -0.8614 (0.1415)	*** -0.3967 (0.1362)			
He was Terminated Last Year	0.4754 (0.3163)	0.1330 (0.3168)	0.6633 *** (0.1703)	0.0275 (0.1626)	-0.1878 (0.2902)	0.1055 (0.2859)			
She was Terminated Last Year	0.5466 (0.4011)	-0.1611 (0.3969)	-0.2551 (0.1938)	-0.0044 (0.1894)	0.8017 (0.3699)	** -0.1568 (0.3577)			

Panel B	(7)	(8)	(9)	(10)	(11)	(12)
His Paid Work Time		-0.0298 *** (0.0063)		-0.0694 *** (0.0038)		0.0396 *** (0.0056)
Her Paid Work Time		-0.1139 *** (0.0064)		0.0431 *** (0.0032)		-0.1570 *** (0.0059)
He was Promoted Last Year	-0.2362 (0.1667)	-0.3009 * (0.1649)	-0.0978 (0.0842)	-0.1314 (0.0823)	-0.1384 (0.1512)	-0.1695 (0.1476)
She was Promoted Last Year	-0.4065 ** (0.1675)	-0.1454 (0.1640)	0.3104 *** (0.0883)	0.1924 ** (0.0862)	-0.7169 *** (0.1482)	-0.3379 ** (0.1420)
He was Terminated Last Year	0.7131 ** (0.3448)	0.3138 (0.3415)	0.5354 *** (0.1852)	-0.0016 (0.1750)	0.1777 (0.3209)	0.3154 (0.3121)
She was Terminated Last Year	0.6614 (0.4313)	0.0466 (0.4148)	-0.0242 (0.2219)	0.1458 (0.2187)	0.6857 * (0.3934)	-0.0992 (0.3775)
# of Times He has been Promoted	0.1271 (0.1102)	0.1779 * (0.1080)	-0.1236 ** (0.0547)	-0.0258 (0.0522)	0.2507 ** (0.1038)	0.2037 ** (0.0987)
# of Times She has been Promoted	-0.2548 ** (0.1159)	-0.0969 (0.1133)	0.0554 (0.0646)	0.0251 (0.0621)	-0.3102 *** (0.1045)	-0.1220 (0.0995)
# of Times He has been Terminated	-0.4309 (0.2690)	-0.3302 (0.2585)	0.2220 (0.1424)	0.0554 (0.1323)	-0.6529 ** (0.2547)	-0.3856 (0.2353)
# of Times She has been Terminated	-0.2406 (0.3411)	-0.4116 (0.2858)	-0.4404 ** (0.2031)	-0.2926 (0.1945)	0.1998 (0.2879)	-0.1191 (0.2466)

Also included are year and state dummies as well as all the covariates reported in Panel C of Table 1. Standard errors are reported in parentheses. Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

Table 4B  
Fixed Effects Estimates of the Time Spent on Housework  
Dual-Earner Sample

Panel A	By the Household		By Men		By Women	
	(1)	(2)	(3)	(4)	(5)	(6)
His Paid Work Time		-0.0225 ** (0.0089)		-0.0568 *** (0.0051)		0.0343 *** (0.0081)
Her Paid Work Time		-0.0921 *** (0.0088)		0.0357 *** (0.0043)		-0.1277 *** (0.0080)
He was Promoted Last Year	-0.2397 (0.1644)	-0.2430 (0.1634)	-0.1114 (0.0880)	-0.1296 (0.0869)	-0.1283 (0.1440)	-0.1135 (0.1425)
She was Promoted Last Year	-0.0188 (0.1646)	0.0548 (0.1632)	0.1696 ** (0.0846)	0.1416 * (0.0841)	-0.1884 (0.1436)	-0.0868 (0.1416)
He was Terminated Last Year	0.4336 (0.4041)	0.3847 (0.4015)	0.0222 (0.2053)	-0.1197 (0.2006)	0.4114 (0.3472)	0.5044 (0.3428)
She was Terminated Last Year	-0.1177 (0.5011)	-0.2767 (0.4972)	-0.2229 (0.2265)	-0.1758 (0.2249)	0.1052 (0.4262)	-0.1009 (0.4183)

Panel B	(7)	(8)	(9)	(10)	(11)	(12)
His Paid Work Time		-0.0235 *** (0.0090)		-0.0569 *** (0.0051)		0.0334 *** (0.0081)
Her Paid Work Time		-0.0914 *** (0.0088)		0.0355 *** (0.0043)		-0.1269 *** (0.0081)
He was Promoted Last Year	-0.3294 * (0.1760)	-0.3421 * (0.1747)	-0.0947 (0.0948)	-0.1317 (0.0936)	-0.2347 (0.1520)	-0.2105 (0.1496)
She was Promoted Last Year	0.0730 (0.1751)	0.1102 (0.1729)	0.1481 * (0.0895)	0.1270 (0.0888)	-0.0751 (0.1534)	-0.0169 (0.1500)
He was Terminated Last Year	0.7559 * (0.4188)	0.6782 (0.4135)	0.0318 (0.2113)	-0.0783 (0.2067)	0.7240 * (0.3739)	0.7565 ** (0.3684)
She was Terminated Last Year	-0.0571 (0.5279)	-0.1683 (0.5234)	-0.1095 (0.2407)	-0.0885 (0.2404)	0.0524 (0.4522)	-0.0798 (0.4438)
# of Times He has been Promoted	0.1970 * (0.1189)	0.2170 * (0.1164)	-0.0332 (0.0609)	0.0075 (0.0594)	0.2302 ** (0.1084)	0.2096 ** (0.1035)
# of Times She has been Promoted	-0.1956 (0.1214)	-0.1148 (0.1201)	0.0535 (0.0661)	0.0373 (0.0646)	-0.2491 ** (0.1084)	-0.1521 (0.1047)
# of Times He has been Terminated	-0.5813 ** (0.2781)	-0.5265 * (0.2730)	-0.0236 (0.1452)	-0.0771 (0.1370)	-0.5578 ** (0.2555)	-0.4494 * (0.2445)
# of Times She has been Terminated	-0.1240 (0.3077)	-0.2104 (0.3062)	-0.2093 (0.1659)	-0.1621 (0.1633)	0.0853 (0.2845)	-0.0483 (0.2767)

Also included are year and state dummies as well as all the covariates reported in Panel C of Table 1. Standard errors are reported in parentheses. Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

The estimated effect of labor market events generally diminishes substantially when controlling for paid work time. The effect of his promotions on his housework time is an exception in that the magnitude changes little in either sample and still has a significant negative association with his housework time in the full sample. The effect of terminations either falls to zero or changes sign in the full sample and loses all statistical significance. The effect of her promotion declines by between 50 and 60%, but remains significant for both partners in the full sample. Her promotions are still associated with more housework time for men in the dual-earner sample, but otherwise there is no significant association between housework time and labor market events for dual-earner households when we include paid work time controls.<sup>26</sup> In general, the results in Panel A suggest that dual-earner households adjust housework time less in response to labor market factors than do non-dual-earner households, perhaps (as discussed earlier) because less of their observed housework time is excess to requirements and/or because they are already outsourcing more tasks than non-dual-earner couples.

As noted above, if these labor market events do provide new information that alters the intra-household balance of power, then they should have not just short-run, but long-run effects on housework time. To accommodate this possibility, we report in Panel B of Tables 4A and 4B the results of a specification including a suite of four additional variables. These additional variables capture the cumulative number of times that each partner has been promoted or terminated, respectively. Key assumptions underlying this specification are that each event provides new information and each has a fixed linear effect on housework time; all that matters is the incremental number of promotions or terminations observed since the start of the observation window, not the total ever experienced. The baseline once-off effects are also estimated in these models, meaning that interpreting how housework time adjusts to successive labor market events requires carefully adding up the estimated coefficients on all relevant variables.

With these caveats in mind, we can report based on Panel B of Table 4A and its analogue for our dual-earner sample, Panel B of Table 4B, that the labor market events of each partner have effects on housework time that linger and accumulate over time. As labor market events of a particular sort accumulate to oneself or to one's partner, we estimate that an individual typically scales up or down his or her housework even more in the direction of specialization indicated by the event.<sup>27</sup> For example, when she is terminated for the first time in our window of observation, he reduces his housework time the next year by almost half an hour; if she is terminated a second time, he reduces his housework time the next year by a further 0.4 of an hour (for a total reduction, compared to her having had no significant labor market event, of 0.9 of an hour). For both men and women in our full samples, most of these once-off and cumulative effects on housework time are significant without controlling for paid work time. Adding such controls leaves only the positive effects of her promotion on his and her housework time, both the first and the second time she is promoted, statistically significant. Even controlling for paid work time, hence, her being promoted once and then again is associated with successive reductions in her housework time and successive, though not fully compensatory, increases in his. In our dual-earner sample, only the effect of her promotion on his housework time is statistically significant (and then only marginally, with a p-value of 0.07) when we control for paid work hours.

In sum, that her housework time decreases when she is promoted can be attributed primarily, but not wholly, to changes in her paid work hours. While observing again an apparent constraint in dual-earner households whereby housework time does not adjust as easily as in our full sample, we conclude for both samples that female promotion is the key labor market event associated with a reallocation of housework time. Much of this

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<sup>26</sup> We re-ran these models with the full sample including dummy variables to identify those observations where he was not employed and those where she was not employed. Results were very similar to those reported here, with a slight decline in statistical significance. When we interact these dummy variables with the variables capturing labor market events, we see some evidence that his housework time responds more to her promotions when he is not employed.

<sup>27</sup> Exceptions are his promotions and terminations, which have the expected long-run effect on her housework time but perverse once-off effects that are significant in the case of terminations in the dual earner sample.

reallocation can be attributed to mechanical time constraints, but some appears to reflect increased bargaining power.<sup>28 29</sup>

In relation to practical significance, and reading from the effects of female promotion on male housework time shown in Columns 3 and 4 of Table 4B (using our dual-earner sample), an instance of female promotion is estimated to increase his housework time allocation by between 10 and 12 minutes in the short run. Evaluated at the sample average, this represents an increase of approximately 3 percent. For women in the dual-earner sample, a promotion reduces housework time by between 10 and 19 minutes, or 1 to 2 percent. By comparison, in our full sample, a woman's housework time allocation is estimated to fall in the short run by between 28 and 62 minutes, or 3 to 6 percent, when she is promoted whereas a man's housework time increases by 13 to 22 minutes or 3.5 to 6 percent. The absolute magnitudes are clearly larger in the full sample; the relative magnitudes are also somewhat larger.

Amongst the other covariates included in these fixed-effects regressions, it is household characteristics that have the most significant associations with housework time. The presence of children, particularly young children, increases reported housework time for both men and women in both samples, but substantially more for women (3.5 versus 0.75 hours after controlling for paid work time), as has been reported elsewhere in the literature (for example, Baxter, Hewitt, and Haynes 2008). Compared to de facto couples, married couples spend more time on housework, in both samples, and this effect is entirely driven by married women doing more housework than their de facto counterparts. Married women do significantly more and married men significantly less housework than de facto partners – i.e., there is more specialization according to traditional gender roles in marriages than in de facto partnerships – even controlling for paid work hours. This result could be power-related, as it is on average more expensive to dissolve a marriage than to dissolve a co-habitation, and if women are on average the less powerful party in relationships, terminating the relationship may be a more credible threat for women in de facto relationships than for those in marriages. However, it could equally be that marriage indicates a deeper investment in the other person on the part of both partners, and this investment comes with higher returns to specialization holding the characteristics of the present partner constant – in line with the argument of Becker (1985).<sup>30</sup>

## 7. Outsourcing

As suggested above, households may produce the housework they need either in-house or by outsourcing. To the extent that households respond to promotions not by adjusting time use within the household, but by

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<sup>28</sup> We also estimated alternative specifications to accommodate longer-term effects. The most flexible of these included a separate dummy for each event for each year since it occurred. This specification included twelve dummy variables for each event, as the most distant event was twelve years in the past. In these specifications, female promotion continued to have the most consistent effect. Her recent promotion was associated with significantly more housework time by her partner in both the full and the dual-earner sample, with some evidence that the impact diminished over time. Evidence that female promotion reduced her housework time was observed only in the full sample and only for recent events. Male promotion was associated with a short-run reduction in his housework time in the full sample and a somewhat delayed increase in her housework time in both the full and the dual-earner samples. In recognition that these labor market events may be more informative to more recently formed couples, we also estimated models incorporating an effect that diminishes at the rate  $1/t$  with the length of the relationship ( $t$ ). The only significant effect is that in the full sample, men reduce their housework time more when she is terminated early in the relationship as compared to later.

<sup>29</sup> We conducted sensitivity tests on our main results by including both earnings and labor market events simultaneously. This is possible only for a subset of the dual-earner sample. The results of these tests indicate that earnings are not statistically significant unless controls for paid work hours are included. In that case, own earnings are significantly negatively related to own housework time, and his earnings are significantly positively related to her housework time. The associations between housework time and labor market events are less significant when including these controls, suggesting that labor market events are proxying for changes in earnings power, in line with our hypothesis.

<sup>30</sup> That we find housework time is significantly lower for cohabiting but not married men after he is promoted or she is fired provides some evidence that married couples are more invested in or better informed about their relationship and less likely to respond to labor market events.

outsourcing more, our estimates will understate the impact promotions have on household behavior. Data on the outsourcing of household chores is available only incompletely and intermittently in the HILDA survey. Individuals are asked in 2005, 2008, and 2011 if they ‘regularly pay someone to do housework’. Information on household expenditures on meals eaten out (not including alcohol) is available in every year except 2002, but these data are not all comparable: respondents are sometimes asked about the household’s monthly expenditures, and sometimes about weekly expenditures, furthermore data are sometimes collected during the personal interviews and sometimes from the self-reported questionnaires. The measure that is most consistently available (from 2006 through 2014) comes from the self-reported questionnaires and enquires about weekly expenditures. No information is provided regarding the use of laundry services or ready-to-eat meals. Most of these data are also reported separately by each partner, creating additional discrepancies. While these data are not sufficient to produce incontestable results, we report some information about outsourcing, employment, and labor market events in Table 5. Panel A provides some simple comparisons; Panel B shows the results of some couple-specific fixed-effects models of expenditures on meals eaten out.

First, there is more outsourcing when both partners are in paid labor than when this is not the case. So, for example, the probability with which both partners report having maid service is more than twice as high (12% versus 5.3%) and expenditures on eating out (converted to 2014 Australian dollars<sup>31</sup>) are about \$16-18 higher per week (30-35% greater) in dual-earner as compared to other households. As dual-earner households likely have more income, and restaurant meals and maid service are normal goods, this result is not unexpected. However, this evidence provides some basic support for the possibility raised above that dual-earner households adjust their housework time less in response to paid labor time because they are already outsourcing more and there are limits on how much housework can be outsourced.

Table 5  
Evidence Regarding Outsourcing

Panel A: Simple Statistics

	<u>Full Sample</u>		<u>Dual-Earner Sample</u>	
	<u>%</u>	<u>Sample Size</u>	<u>%</u>	<u>Sample Size</u>
Fraction of Households in which both partners report having maid service				
Overall	10.0%	7762	12.0%	5427
Weekly expenditures on eating out by the household (\$2014 AU)				
His report	\$66.27	13,537	\$71.16	9,547
Her report	\$62.08	15,967	\$66.92	11,553

Panel B: Fixed Effects model of weekly expenditures on eating out

	<u>Full Sample</u>		<u>Dual-Earner Sample</u>	
	<u>w/o Hours</u>	<u>with Hours</u>	<u>w/o Hours</u>	<u>with Hours</u>
<u>His report</u>				
He was Promoted Last Year	0.8579 (1.1489)	0.9732 (1.1464)	-0.0799 (1.4242)	-0.0484 (1.4203)
She was Promoted Last Year	0.9456	0.6236	0.0280	0.0481

<sup>31</sup> A handful of values indicating expenditures above \$1000 per week were judged to be implausible and recoded as missing.



	(1.2489)	(1.2489)	(1.4033)	(1.3959)
He was Terminated Last Year	-5.6731 ***	-2.8379	-6.2938 *	-5.4062 *
	(2.0576)	(2.0493)	(3.2337)	(3.2080)
She was Terminated Last Year	1.8413	3.4141	-1.2093	-0.5729
	(2.7560)	(2.7761)	(3.5001)	(3.5166)
<u>Her report</u>				
He was Promoted Last Year	0.1990	0.4201	-0.2432	-0.1578
	(0.9325)	(0.9297)	(1.1308)	(1.1265)
She was Promoted Last Year	2.7894 ***	2.1000 **	2.9366 ***	2.6888 **
	(1.0122)	(1.0218)	(1.1207)	(1.1207)
He was Terminated Last Year	-4.2378 **	-2.1567	-3.8986	-3.4826
	(1.7316)	(1.7398)	(2.4830)	(2.4695)
She was Terminated Last Year	-0.9758	0.6755	-3.4448	-2.7692
	(2.3171)	(2.2851)	(3.2681)	(3.2534)

Also included are year and state dummies as well as all the covariates reported in Panel C of Table 1. Standard errors are reported in parentheses.

Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

Second, there is some evidence in Panel B that expenditures on eating out are influenced by labor market events.<sup>32</sup> Using only the consistent 2006+ data on weekly expenditures, we estimate couple-specific fixed effects models using the same set of covariates included in the housework time equations for both his and her reports of expenditures. The results reported in Table 5 are from specifications that allow only for once-off effects. These results consistently indicate that expenditures on eating out drop when his job is terminated, significantly so in 4 of 8 specifications. In models allowing for longer-term effects, the differential is significant in 7 of 8 specifications. The only other consistent result arising from these models is that expenditures on eating out rise when she is promoted. This effect is consistent with the negative association we find in earlier models between her promotions and her housework time, although it is only significant when we use her expenditure reports, and it appears short-lived.

## 8. Heterogeneous responses to labor market events

Rigidity in beliefs about how people of different genders *should* spend their time may determine in part the way in which labor market events impact intra-household bargaining decisions, by acting as an invisible constraint on the flexibility of intra-household housework time allocations. Previous researchers have generally found a significant association between housework time and these sorts of gender attitudes, particularly women's attitudes (Greenstein 1996 and 2000; Cunningham 2008; Baxter and Hewitt 2013). To explore the evidence for this in our data, we create a couple-level indicator for innate flexibility around housework time allocations, based on the views of the partners in regard to the proper role of women in the household. In four of the HILDA waves (2001, 2005, 2008, and 2011), respondents were asked to what extent they agreed with the statement, "It is better for everyone involved if the man earns the money and the woman takes care of the home

<sup>32</sup> While we would like to model maid service as well, the data on maid service available in HILDA is inadequate to produce meaningful results. We did experiment with models of the number of times meals were eaten out, for which three waves of data are available. Using these data we find that dual-earner couples eat out more, and that households in which a partner has been promoted eat more meals out than households experiencing no labor market events. We also find that housework time reported by other household members – arguably another form of outsourcing – falls when she is terminated and rises when he is terminated, both overall and relative to the changes observed for those experiencing no labor market events.

and children.” Coded on a 7-point scale where 1 is strongly disagree and 7 is strongly agree, this question reveals gender-role attitudes. Responses on the lower end of the scale suggest relatively liberal gender role attitudes; responses on the higher end of the scale suggest more conservative views and identify households that may exhibit more rigidity in the allocation of housework time across partners.

We find that these attitudes are highly correlated with the education level of the couple. Comparing the gender-related attitudes of couples in which each partner has a bachelor’s degree or more with those of couples in which both are less educated – specifically, in which he has a trade degree or less and she has a high school degree or less – we find that 40% of the more-educated partners share more liberal attitudes (response values 1 and 2 on the above question) as compared with only 18% of the less-educated partners. Similarly, while 34% of the less educated more or less agree (responses 4 to 7) that women belong in the home, this is true of only 14% of the more educated. Thus, we infer that individuals in less-educated households are likely to respond differently to labor market events than individuals in more-educated households, due to the inertia created by their more conservative views about gender roles. In support of this conjecture, we find that the men in less-educated households perform almost an hour less, while the women perform about 2.4 hours more, housework than their counterparts in other households.<sup>33</sup>

To examine this conjecture, we repeat our analysis interacting the labor market event measures with dummy variables identifying the education level of the household. As no significant differences were observed between the responses of more-educated households and the mixed-education households that formed our comparison group, we report estimates from models that only identify group-specific effects for the less educated households. Results for our full sample are reported in Table 6 using specifications that include controls for labor market hours.

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<sup>33</sup> Aguiar and Hurst (2007) and Grossbard-Shechtman and Amuedo-Dorantes (2007) also find gender differences in behavior by education level. Aguiar and Hurst, using US time-diary data from 2003 find that men with less than a high school education spend 12.9 hours per week on housework, as compared to 13.7 hours for those with a college degree – a difference of 0.8 hours. Women with less than a college degree report spending 26.2 hours per week on housework, as compared to 20.8 hours for women with a college degree – a difference of 5.4 hours. Differences by education level in the levels and impact of unpaid labor time have been conjectured by prior authors (e.g., Grossbard-Shechtman and Amuedo-Dorantes 2007 and Gimenez-Nadal and Sevilla 2016) to result from differences in preferences or ideology for people of different education levels. For example, Grossbard-Shechtman and Amuedo-Dorantes (2007) report that while a higher male-to-female sex ratio gives women more power to reduce their labor supply, that impact is attenuated for less-educated married women. The authors conjecture that this is because less-educated couples prefer a more gendered division of labor, all else equal.

Table 6  
Heterogeneous Effects of Labor Market Events  
By Education Level

	<u>Not Both Less Educated</u>				<u>Both Less Educated</u>				
	<u>His Housework Time</u>		<u>Her Housework Time</u>		<u>His Housework Time</u>		<u>Her Housework Time</u>		
He was Promoted Last Year	-0.0700 (0.0896)	-0.0693 (0.0961)	-0.1064 (0.1580)	-0.1854 (0.1704)	-0.3033 (0.1425)	** -0.2549 (0.1519)	* -0.0114 (0.2659)	-0.1654 (0.2818)	
She was Promoted Last Year	0.2042 (0.0957)	** 0.2012 (0.1001)	** -0.2591 (0.1507)	* -0.2344 (0.1557)	0.1747 (0.1550)	0.1670 (0.1645)	-0.7353 (0.2893)	** -0.4868 (0.3109)	
He was Terminated Last Year	0.1779 (0.2028)	0.2101 (0.2180)	-0.3688 (0.3207)	-0.3238 (0.3668)	-0.2417 (0.2659)	-0.3720 (0.2867)	0.9509 (0.5368)	* 1.4093 (0.5480)	**
She was Terminated Last Year	0.0331 (0.2371)	0.1798 (0.2718)	-0.3612 (0.3884)	-0.2345 (0.4091)	-0.0715 (0.3133)	0.0808 (0.3657)	0.2260 (0.7279)	0.1065 (0.7635)	
# of Times He has been Promoted		0.0013 (0.0589)		0.1662 (0.1061)		-0.1037 (0.0814)		0.9406 (0.4934)	*
# of Times She has been Promoted		0.0219 (0.0684)		-0.0244 (0.1068)		0.0261 (0.1065)		0.2784 (0.1740)	
# of Times He has been Terminated		-0.0540 (0.1637)		-0.0823 (0.2701)		0.2611 (0.2106)		-0.4833 (0.1881)	**
# of Times She has been Terminated		-0.2717 (0.2358)		-0.2578 (0.2719)		-0.3415 (0.2873)		-0.9204 (0.4101)	**

All specifications include controls for his and her hours of paid labor, year and state dummies, and all the covariates listed in Panel C of Table 1.

Standard errors in parentheses.

Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

We find that less-educated men with less-educated wives – i.e., men in couples that on average have more conservative views about gender roles – but not other men reduce their housework time significantly upon being promoted. We interpret this as strong evidence that the behavior of men in less-educated households drives the result in our full sample that promoted men subsequently do less housework. Furthermore, in these less-educated households, men report no change (point estimates are negative) in housework hours when they are terminated, while their partners' housework time rises, especially in the near term – results that are of the opposite sign to those observed in other households.<sup>34</sup> However, we also find that women in these households reduce their housework hours more (about half an hour more) than women in other households when they themselves are promoted, while it is only men in the less-conservative households who significantly increase their housework hours in response to their partners' promotions. We conclude that women in less-educated households are those who have the most *excess* in their housework time allocations,<sup>35</sup> that their partners do not respond to their wives' labor market successes by doing more housework, and also that they and their partners appear to respond to the stress of a man's first-time termination by 'doing gender' (i.e., by her performing more housework and him less).<sup>36</sup>

Results from the dual-earner sample are broadly similar. The effects of his and her promotions are comparable to those estimated for the full sample, but are only marginally statistically significant. The effect of his termination, however, is actually accentuated. Both the decrease in his housework time and the increase in hers in less-educated households in which he is terminated are statistically significant.

Other characteristics that might be associated with beliefs regarding the role of women in the household include age and immigrant status. Yet, we find that neither age nor immigrant status is as strongly correlated with gender attitudes as education level. Interactions between age (defined to identify couples in which both partners were born before 1960) and our indicators of labor market events yield similar results to those observed when we interact education and labor market event indicators, though both parties' responses to her promotion (men increasing their housework time and women decreasing theirs) are more statistically significant in younger couples. There is also some evidence that amongst less-educated couples, younger women increase their housework time less than older women when their partners are promoted. This is consistent with the conjecture that women may have more power to draw upon in intra-household bargaining when they are young than when they are old. Interactions between immigrant status (defined to identify couples in which at least one partner was not born in Australia) and labor market event indicators suggest that immigrant households are more likely than non-immigrant households to respond to her promotions by increasing his housework time and reducing her housework time, and less likely to respond to his promotions by decreasing his housework time – a response pattern that favors the female partner.

## 9. Robustness and sensitivity tests

We estimated a variety of alternative specifications to ensure that the results reported here are not spurious. In particular, we constructed an alternative measure of promotions/job changes to address the possibility that an individual would change jobs not because the new job was 'better' but because s/he was moving to follow his/her partner. Specifically, we excluded job changes that occurred in the same year that a partner was

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<sup>34</sup> That men's terminations might, particularly for less-educated samples, be associated with a reduction in men's and an increase in women's housework time could be a consequence of an injury or sickness that negatively influences both his ability to work for pay and his ability to work in the home. However, we find no evidence that either the negative association between men's terminations and men's housework time, or the positive association between men's terminations and women's housework time, is driven by long-term health shocks.

<sup>35</sup> Our findings are consistent with those of Killewald and Gough (2010) who find that low-earning women change their housework hours more than others. They hypothesize that such women initially spend more time on housework and find it easier and cheaper to outsource or forego housework than women earning higher wages, who have already made the easy adjustments.

<sup>36</sup> Notably, even when we control for earnings, men in less-educated households still reduce their housework time following either a promotion or a termination.

promoted and the couple moved more than 100 kilometers. Our results are robust to this modification. In addition, we considered a somewhat more inclusive dual-earner sample, including households in which individuals may not be currently employed but were recently (defined as within the last six months) terminated, are classified as actively seeking employment at the time of the survey, and are employed in the following survey year. The concern here is that by defining dual-earner couples only based on current employment status, we could be missing some observations on couples who are only in a temporary sense not dual earners. Again, the results are robust to this alternative measure, with the effect of terminations being slightly magnified in the modified dual-earner sample.

We have in the text of the paper presented the results of specifications that allow labor market events to have a one-time effect as well as specifications that allow both a one-time effect and a persistent, or cumulative, effect. As implemented, the latter models assume that each event provides equally important new information regarding economic power, but we considered some alternative non-linear models as well. One such model includes both a one-time shock and a lagged effect. To estimate such a model we must drop one observation per couple/spell, and hence lose a substantial number of observations. Results suggest that her promotions are associated with a reduction in her housework time and an increase in his, but that the effect of these events on his time spent on housework wears off after approximately two years. We also estimated models that accommodate both a one-time effect and a persistent effect that levels out after two (or three) events. The latter model essentially assumes that while the first labor market event may be attributable to luck, subsequent events of the same type constitute a simple (non-cumulative) signal regarding an individual's labor market opportunities. The cumulative model presented in the text seems to provide a better fit to the data than these alternative models, although this could be due to mismeasurement in our persistence measure: we only observe labor market events that occur within the time frame of the survey (2001-2014), and not those that may have occurred earlier, so our measure of the number of each type of event is imperfect.

## 10. Discussion

We explore the impact that significant labor market events, specifically promotions and terminations, have upon the total and intra-household allocation of housework time in Australian households. We look for evidence of the mechanisms that could explain such an impact. One is mechanical: job promotions are on average associated with an increase in paid work hours, while terminations are associated with a decrease in paid work hours. More time spent in one activity must necessarily reduce time spent in another. At the same time, labor market events may alter the intra-household balance of power. Assuming housework is a necessary but not desirable activity, individuals who experience positive labor market events may push their partners to take on a greater share of housework responsibilities, independent of any changes driven by changes in their paid work time. Individuals may also opt to outsource more or less housework, or alter the 'excess' time they spend on housework activities, in order to accommodate changes in either paid work time and/or the intra-household balance of power. These responses may furthermore be heterogeneous depending upon household beliefs regarding appropriate gender roles.

Our analysis of these questions proceeds using panel data on couples from the Australian HILDA survey. Our results indicate that at the household level, housework time is not very sensitive to labor market events, particularly when controlling for time in paid work, suggesting that couples fairly accurately assess one another's labor market opportunities *ex ante* and adjust little *ex post*. Increased time in paid work is associated with less housework time, but the trade-off is significantly less than one-for-one and partners make up for some of the difference, supporting our supposition that there is some basic level of housework that households need to provide. At the individual level, her promotions elicit the most significant and consistent changes in housework time, with promoted women spending less time on housework and their partners spending more. These effects are significant even after controlling for paid work time and persist at least somewhat even when the sample is restricted to dual-earner couples who, in general, adjust their housework time less following labor market events. That dual-earner couples adjust their housework time less than other couples following labor market events may be because they have less 'excess' housework time to play with, and/or because they already outsource those housework activities that are easiest to outsource. We present some evidence that dual-earner

households are more likely to have maid service and spend more on eating out, in partial support of the outsourcing explanation.

We also find some evidence that less-educated households, who on average have less liberal attitudes regarding gender roles and whose baseline female-male differential in housework time allocation is larger than that observed in more-educated households, also react differently to labor market events than the rest of the population. Men in less-educated households respond less and women respond more to women's promotions, suggesting that there may be more 'excess' housework time in these households but also that the sharing of housework tasks across genders in such households is tempered by their more traditional gender role attitudes. In support of the gender-role-related explanation, promoted men in less-educated households tend to reduce their time on housework more, and their women increase their housework time more, than is the case in other households in which men are promoted. Furthermore, when men in less-educated households are terminated, they reduce while their partners increase their housework time, whereas in other households the effects point in the opposite direction. In sum, these reactions suggest that less-educated couples may respond to changes in his paid work commitments by 'doing gender' to demonstrate their support for the stereotypical male breadwinner. The effects of his termination are even stronger in the less-educated, dual-earner sample.

In conclusion, we employ a couple-specific fixed-effects estimator to investigate whether and how couples modify intra-household time allocations to routine housework tasks in response to such significant labor market events as promotion and termination. This approach has conceptual advantages over the more standard earnings analysis. The fixed-effects specification also washes out all gender and couple-specific, time-invariant factors that may bias cross-sectional estimates. Our results indicate that female promotion in particular leads to changes in housework time that are consistent with the hypothesis that intra-household economic power plays a role in decisions about the allocation of time to housework, even controlling for paid work time. Thus, female promotions appear to yield new information that can cause couples to update their priors regarding economic power. However, we also find evidence that conservative gender role attitudes moderate that response, and may cause households to respond in even more gendered ways to labor market signals.

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Appendix Table A  
Labor Market Events as a Function of Housework Time

	Full Sample		Dual-Earner Sample		
	<u>His Housework Time (t-1)-(t-2)</u>	<u>Her Housework Time (t-1)-(t-2)</u>	<u>His Housework Time (t-1)-(t-2)</u>	<u>Her Housework Time (t-1)-(t-2)</u>	
<u>Panel A: Events between (t-1) and t</u>					
He was Promoted Last Year	0.0060 (0.0506)	0.0360 (0.0256)	0.0176 (0.0737)	0.0251 (0.0401)	
He was Terminated Last Year	0.0064 (0.0261)	0.0030 (0.0139)	0.0009 (0.0261)	0.0154 (0.0176)	
She was Promoted Last Year	0.0594 (0.0494)	0.0021 (0.0230)	-0.0063 (0.0779)	0.0285 (0.0406)	
She was Terminated Last Year	-0.0063 (0.0249)	0.0108 (0.0102)	-0.0150 (0.0294)	0.0379 (0.0164)	**
<u>Panel B: Events between (t-1) and (t-0.5)</u>					
He was Promoted Last Year	0.0221 (0.0364)	0.0298 (0.0183)	0.0444 (0.0509)	-0.0126 (0.0285)	
He was Terminated Last Year	0.0005 (0.0167)	0.0039 (0.0092)	0.0002 (0.0182)	0.0152 (0.0135)	
She was Promoted Last Year	-0.0148 (0.0327)	0.0184 (0.0155)	-0.0167 (0.0531)	0.0244 (0.0284)	
She was Terminated Last Year	0.0103 (0.0159)	0.0048 (0.0059)	-0.0047 (0.0179)	0.0114 (0.0086)	

All coefficients and standard errors are multiplied by 100.

All specifications include year dummies and all the covariates reported in Panel C of Table 1.

Standard errors in parentheses. Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

Appendix Table B  
Simple Difference and Difference-in-Difference Results  
Dual-Earner Sample

Panel A:	Simple Difference							
	He was				She was			
	Promoted/ Changed Jobs		Terminated		Promoted/ Changed Jobs		Terminated	
Household Paid Time	0.64	**	-1.93	**	1.49	***	-2.14	**
His Paid Time	0.64	***	-2.58	***	0.04		-0.45	
Her Paid Time	0.00		0.65		1.44	***	-1.69	**
Household Housework Time	-0.08		0.46		-0.21		-0.45	
His Housework Time	-0.06		0.06		0.14		-0.24	
Her Housework Time	-0.02		0.40		-0.34	**	-0.21	
Panel B:	Difference-in-Difference							
Household Paid Time	0.97	***	-1.59	*	1.82	***	-1.81	*
His Paid Time	0.92	***	-2.30	***	0.32		-0.17	
Her Paid Time	0.05		0.71		1.50	***	-1.64	*
Household Housework Time	-0.13		0.40		-0.26		-0.50	
His Housework Time	-0.11		0.02		0.09		-0.29	
Her Housework Time	-0.03		0.39		-0.35	*	-0.22	
# of Observations	2732		363		2827		269	

Appendix Table C  
Fixed Effects Estimates of the Time Spent on Housework  
Other Coefficients from Table 4A

	By the Household		By Men		By Women	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Panel A: Full Sample</u>						
Married	0.6984 ** (0.3225)	0.6226 ** (0.3167)	-0.3113 * (0.1695)	-0.1069 (0.1638)	1.0097 *** (0.2854)	0.7295 *** (0.2724)
# of Children Age 0-4	5.3216 *** (0.1880)	4.2385 *** (0.1881)	0.3428 *** (0.0784)	0.7528 *** (0.0831)	4.9788 *** (0.1852)	3.4858 *** (0.1771)
# of Children Age 5-9	3.4465 *** (0.1907)	3.0332 *** (0.1875)	0.3188 *** (0.0962)	0.5325 *** (0.0937)	3.1277 *** (0.1790)	2.5006 *** (0.1693)
# of Children Age 10-14	2.5058 *** (0.1888)	2.3093 *** (0.1861)	0.1879 ** (0.0912)	0.3490 *** (0.0874)	2.3178 *** (0.1777)	1.9603 *** (0.1697)
# of Other Dependents	1.3302 *** (0.1929)	1.4007 *** (0.1914)	0.0520 (0.0950)	0.1847 ** (0.0907)	1.2781 *** (0.1763)	1.2160 *** (0.1713)
# of Other Adults	0.6473 *** (0.2167)	0.7897 *** (0.2158)	-0.0826 (0.0997)	-0.0460 (0.0952)	0.7299 *** (0.2038)	0.8358 *** (0.2007)
He is Disabled	0.0756 (0.2721)	-0.1036 (0.2698)	0.0832 (0.1532)	-0.1837 (0.1480)	-0.0076 (0.2479)	0.0801 (0.2441)
She is Disabled	0.8406 *** (0.2814)	0.4860 * (0.2763)	-0.0046 (0.1389)	0.1276 (0.1370)	0.8452 *** (0.2603)	0.3584 (0.2521)
Have a Disabled Child	-0.2762 (0.3671)	-0.2039 (0.3594)	-0.0847 (0.1705)	-0.0532 (0.1677)	-0.1915 (0.3526)	-0.1506 (0.3425)
Have another Disabled Resident	0.7485 * (0.3974)	0.6631 * (0.3972)	0.0857 (0.1936)	0.0750 (0.1895)	0.6628 * (0.3632)	0.5881 (0.3613)
Lives in a Major City	-0.2315	-0.1039	0.2890	0.2458	-0.5205	-0.3497

	(0.5603)		(0.5474)		(0.3154)		(0.3007)		(0.5246)		(0.4905)	
Lives in another Urban Area	0.8423		0.7211		0.3628		0.3974		0.4795		0.3237	
	(0.5201)		(0.5160)		(0.3079)		(0.2948)		(0.4968)		(0.4821)	
Live in a House	-0.0351		0.0888		0.0630		0.0582		-0.0981		0.0306	
	(0.3665)		(0.3660)		(0.1916)		(0.1888)		(0.3140)		(0.3106)	
Live in a Townhouse	-0.5953		-0.4698		-0.0629		-0.1183		-0.5323		-0.3515	
	(0.4190)		(0.4196)		(0.2471)		(0.2431)		(0.3568)		(0.3528)	
Moved in last year	-0.0934		-0.2544		-0.0804		-0.0626		-0.0130		-0.1917	
	(0.1715)		(0.1708)		(0.0869)		(0.0860)		(0.1550)		(0.1517)	
His Non-labor Income	0.0344		0.0291		0.0114		0.0045		0.0230		0.0246	
	(0.0242)		(0.0240)		(0.0109)		(0.0092)		(0.0284)		(0.0263)	
Her Non-labor Income	-0.0155		-0.0352		0.0009		0.0009		-0.0164		-0.0361	
	(0.0263)		(0.0257)		(0.0121)		(0.0119)		(0.0253)		(0.0247)	
His Gift Income	-0.0001		-0.0002		-0.0005		-0.0010		0.0004		0.0008	
	(0.0019)		(0.0017)		(0.0008)		(0.0007)		(0.0020)		(0.0018)	
Her Gift Income	0.0002		0.0000		-0.0003		0.0001		0.0005		-0.0001	
	(0.0022)		(0.0021)		(0.0012)		(0.0012)		(0.0019)		(0.0019)	
He is Enrolled Full-Time in Education	0.3137		-0.2429		0.0713		-1.0062	***	0.2424		0.7633	
	(0.6179)		(0.6118)		(0.3319)		(0.3226)		(0.5638)		(0.5527)	
She is Enrolled Full-Time in Education	-0.2900		-1.2794	***	0.4522	*	0.7932	***	-0.7422	*	-2.0726	***
	(0.4369)		(0.4489)		(0.2380)		(0.2398)		(0.3985)		(0.4155)	
<b><u>Panel B: Dual-Earner Sample</u></b>	(7)		(8)		(9)		(10)		(11)		(12)	
Married	0.7582	**	0.7524	**	-0.2176		-0.1264		0.9758	***	0.8788	***
	(0.3205)		(0.3194)		(0.1711)		(0.1668)		(0.2693)		(0.2640)	
# of Children Age 0-4	4.8436	***	4.0862	***	0.4443	***	0.7414	***	4.3993	***	3.3448	***
	(0.2240)		(0.2268)		(0.0938)		(0.0998)		(0.2158)		(0.2106)	
# of Children Age 5-9	3.3303	***	2.9479	***	0.3389	***	0.5294	***	2.9913	***	2.4185	***

	(0.2124)		(0.2121)		(0.1005)		(0.0993)		(0.1998)		(0.1944)
# of Children Age 10-14	2.3901 ***		2.1686 ***		0.2857 ***		0.4161 ***		2.1044 ***		1.7526 ***
	(0.2077)		(0.2071)		(0.0992)		(0.0971)		(0.1879)		(0.1843)
# of Other Dependents	1.4301 ***		1.3855 ***		0.1285		0.2295 **		1.3016 ***		1.1560 ***
	(0.2108)		(0.2102)		(0.1020)		(0.0998)		(0.1835)		(0.1816)
# of Other Adults	0.7646 ***		0.7971 ***		-0.0151		0.0129		0.7797 ***		0.7842 ***
	(0.2366)		(0.2355)		(0.1073)		(0.1049)		(0.2136)		(0.2111)
He is Disabled	0.1309		0.1164		0.1639		0.0693		-0.0330		0.0471
	(0.3242)		(0.3237)		(0.1517)		(0.1507)		(0.2863)		(0.2861)
She is Disabled	0.7422 **		0.5924 *		-0.2328		-0.1329		0.9750 ***		0.7253 **
	(0.3522)		(0.3490)		(0.1605)		(0.1590)		(0.3115)		(0.3067)
Have a Disabled Child	-0.3519		-0.3182		-0.2572		-0.2531		-0.0947		-0.0651
	(0.4453)		(0.4411)		(0.1856)		(0.1865)		(0.4050)		(0.3987)
Have another Disabled Resident	0.9606 **		0.9594 **		-0.0172		0.0104		0.9778 **		0.9490 **
	(0.4452)		(0.4445)		(0.1892)		(0.1878)		(0.4002)		(0.3993)
Lives in a Major City	0.3656		0.4702		0.1884		0.1954		0.1772		0.2748
	(0.6304)		(0.6267)		(0.3473)		(0.3442)		(0.5626)		(0.5473)
Lives in another Urban Area	1.1415 *		1.0463 *		0.0880		0.1222		1.0535 *		0.9241 *
	(0.5954)		(0.5905)		(0.3024)		(0.2953)		(0.5496)		(0.5359)
Live in a House	0.5582		0.5941		0.2105		0.1954		0.3477		0.3987
	(0.3714)		(0.3729)		(0.2042)		(0.2011)		(0.3013)		(0.2995)
Live in a Townhouse	0.3826		0.4249		0.2189		0.1827		0.1637		0.2422
	(0.4253)		(0.4247)		(0.2270)		(0.2252)		(0.3454)		(0.3395)
Moved in last year	-0.1504		-0.1884		-0.0128		-0.0002		-0.1377		-0.1882
	(0.1825)		(0.1816)		(0.0997)		(0.0989)		(0.1588)		(0.1568)
His Non-labor Income	0.0483 *		0.0466 *		0.0182		0.0147		0.0302		0.0319
	(0.0273)		(0.0270)		(0.0123)		(0.0117)		(0.0260)		(0.0255)
Her Non-labor Income	-0.0002		-0.0094		-0.0124		-0.0129		0.0122		0.0035

	(0.0321)	(0.0321)	(0.0146)	(0.0140)	(0.0299)	(0.0300)
His Gift Income	0.0001	-0.0003	-0.0008	-0.0011	0.0009	0.0008
	(0.0019)	(0.0019)	(0.0007)	(0.0007)	(0.0021)	(0.0020)
Her Gift Income	-0.0008	-0.0006	-0.0030 ***	-0.0027 ***	0.0022	0.0021
	(0.0024)	(0.0023)	(0.0009)	(0.0009)	(0.0024)	(0.0023)
He is Enrolled Full-Time in Education	-0.6104	-0.8454	0.0816	-0.4853	-0.6921	-0.3601
	(0.6633)	(0.6674)	(0.3203)	(0.3175)	(0.5714)	(0.5688)
She is Enrolled Full-Time in Education	0.1181	-0.5551	0.4281	0.7027 **	-0.3100	-1.2577 **
	(0.5990)	(0.6127)	(0.2894)	(0.2908)	(0.5463)	(0.5604)

All specifications also include year and state dummies.

Standard errors in parentheses.

Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.

Appendix Table D  
Fixed Effects Estimates of the Time Spent on Housework  
Other Coefficients from Table 4B

	By the Household		By Men		By Women	
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Panel A: Full Sample</u>						
Married	0.7536 ** (0.3304)	0.6021 * (0.3242)	-0.2830 (0.1730)	-0.1050 (0.1676)	1.0366 *** (0.2925)	0.7071 ** (0.2787)
# of Children Age 0-4	5.2967 *** (0.1901)	4.2015 *** (0.1907)	0.3672 *** (0.0790)	0.7537 *** (0.0836)	4.9295 *** (0.1874)	3.4478 *** (0.1795)
# of Children Age 5-9	3.4033 *** (0.1914)	2.9823 *** (0.1887)	0.3392 *** (0.0968)	0.5315 *** (0.0943)	3.0641 *** (0.1790)	2.4508 *** (0.1699)
# of Children Age 10-14	2.4678 *** (0.1894)	2.2668 *** (0.1870)	0.2046 ** (0.0926)	0.3483 *** (0.0885)	2.2633 *** (0.1781)	1.9185 *** (0.1703)
# of Other Dependents	1.3048 *** (0.1925)	1.3637 *** (0.1912)	0.0590 (0.0953)	0.1800 ** (0.0909)	1.2458 *** (0.1761)	1.1837 *** (0.1714)
# of Other Adults	0.6421 *** (0.2167)	0.7748 *** (0.2162)	-0.0805 (0.0993)	-0.0485 (0.0951)	0.7226 *** (0.2034)	0.8233 *** (0.2008)
He is Disabled	0.0815 (0.2719)	-0.0930 (0.2697)	0.0800 (0.1533)	-0.1812 (0.1480)	0.0015 (0.2477)	0.0882 (0.2438)
She is Disabled	0.8266 *** (0.2815)	0.4927 * (0.2764)	-0.0012 (0.1390)	0.1310 (0.1370)	0.8278 *** (0.2606)	0.3617 (0.2524)
Have a Disabled Child	-0.2801 (0.3682)	-0.2079 (0.3602)	-0.0828 (0.1706)	-0.0531 (0.1679)	-0.1972 (0.3533)	-0.1548 (0.3430)
Have another Disabled Resident	0.7526 * (0.3979)	0.6651 * (0.3973)	0.0782 (0.1934)	0.0716 (0.1893)	0.6744 * (0.3634)	0.5935 (0.3616)
Lives in a Major City	-0.2567 (0.5603)	-0.0897 (0.5492)	0.2658 (0.3191)	0.2407 (0.3034)	-0.5225 (0.5270)	-0.3305 (0.4928)



Lives in another Urban Area	0.8446 (0.5210)	0.7450 (0.5177)	0.3321 (0.3135)	0.3881 (0.2990)	0.5125 (0.5006)	0.3569 (0.4848)				
Live in a House	-0.0030 (0.3658)	0.0853 (0.3659)	0.0904 (0.1917)	0.0678 (0.1887)	-0.0934 (0.3136)	0.0175 (0.3109)				
Live in a Townhouse	-0.5807 (0.4186)	-0.4765 (0.4190)	-0.0624 (0.2466)	-0.1205 (0.2428)	-0.5183 (0.3557)	-0.3561 (0.3521)				
Moved in last year	-0.1123 (0.1716)	-0.2607 (0.1709)	-0.0818 (0.0872)	-0.0635 (0.0862)	-0.0305 (0.1549)	-0.1972 (0.1516)				
His Non-labor Income	0.0352 (0.0242)	0.0297 (0.0242)	0.0111 (0.0107)	0.0045 (0.0091)	0.0241 (0.0282)	0.0252 (0.0264)				
Her Non-labor Income	-0.0154 (0.0263)	-0.0345 (0.0257)	0.0000 (0.0120)	0.0007 (0.0119)	-0.0154 (0.0252)	-0.0352 (0.0246)				
His Gift Income	-0.0001 (0.0019)	-0.0002 (0.0017)	-0.0005 (0.0008)	-0.0010 (0.0007)	0.0004 (0.0020)	0.0008 (0.0018)				
Her Gift Income	0.0003 (0.0022)	0.0000 (0.0021)	-0.0003 (0.0011)	0.0001 (0.0012)	0.0006 (0.0019)	-0.0001 (0.0019)				
He is Enrolled Full-Time in Education	0.3196 (0.6176)	-0.2305 (0.6113)	0.0555 (0.3320)	-1.0035 (0.3222)	*** (0.5646)	0.2640 (0.5529)	0.7731 (0.5529)			
She is Enrolled Full-Time in Education	-0.3266 (0.4343)	-1.2894 (0.4474)	*** (0.2383)	0.4665 (0.2401)	* (0.2401)	0.7977 (0.3954)	*** (0.3954)	** (0.3954)	-2.0871 (0.4136)	
<b>Panel B: Dual-Earner Sample</b>										
	(7)	(8)	(9)	(10)	(11)	(12)				
Married	0.7567 (0.3302)	** (0.3285)	0.7154 (0.3285)	** (0.1748)	-0.2254 (0.1707)	-0.1437 (0.1707)	0.9820 (0.2761)	*** (0.2761)	0.8591 (0.2701)	*** (0.2701)
# of Children Age 0-4	4.8078 (0.2244)	*** (0.2278)	4.0496 (0.2278)	*** (0.0943)	0.4495 (0.0943)	*** (0.1008)	0.7372 (0.1008)	*** (0.2159)	4.3582 (0.2159)	*** (0.2110)
# of Children Age 5-9	3.2849 (0.2124)	*** (0.2122)	2.9024 (0.2122)	*** (0.1008)	0.3445 (0.1008)	*** (0.0998)	0.5261 (0.0998)	*** (0.1999)	2.9404 (0.1999)	*** (0.1944)

# of Children Age 10-14	2.3479 ***	2.1260 ***	0.2915 ***	0.4137 ***	2.0564 ***	1.7124 ***
	(0.2075)	(0.2070)	(0.0996)	(0.0972)	(0.1880)	(0.1844)
# of Other Dependents	1.4007 ***	1.3532 ***	0.1284	0.2249 **	1.2723 ***	1.1283 ***
	(0.2094)	(0.2092)	(0.1021)	(0.0998)	(0.1830)	(0.1815)
# of Other Adults	0.7578 ***	0.7885 ***	-0.0138	0.0123	0.7716 ***	0.7762 ***
	(0.2365)	(0.2354)	(0.1072)	(0.1049)	(0.2135)	(0.2111)
He is Disabled	0.1325	0.1177	0.1640	0.0696	-0.0314	0.0481
	(0.3250)	(0.3243)	(0.1519)	(0.1508)	(0.2872)	(0.2868)
She is Disabled	0.7352 **	0.5937 *	-0.2324	-0.1317	0.9676 ***	0.7254 **
	(0.3518)	(0.3485)	(0.1606)	(0.1590)	(0.3114)	(0.3066)
Have a Disabled Child	-0.3617	-0.3249	-0.2553	-0.2518	-0.1063	-0.0730
	(0.4455)	(0.4411)	(0.1856)	(0.1865)	(0.4050)	(0.3987)
Have another Disabled Resident	0.9717 **	0.9682 **	-0.0208	0.0086	0.9924 **	0.9596 **
	(0.4461)	(0.4453)	(0.1892)	(0.1878)	(0.4004)	(0.3997)
Lives in a Major City	0.3611	0.4823	0.1815	0.1959	0.1796	0.2864
	(0.6340)	(0.6308)	(0.3495)	(0.3462)	(0.5672)	(0.5509)
Lives in another Urban Area	1.1625 *	1.0787 *	0.0802	0.1228	1.0823 **	0.9558 *
	(0.5973)	(0.5925)	(0.3046)	(0.2973)	(0.5514)	(0.5374)
Live in a House	0.5587	0.5717	0.2111	0.1889	0.3475	0.3828
	(0.3702)	(0.3720)	(0.2044)	(0.2008)	(0.3003)	(0.2993)
Live in a Townhouse	0.3858	0.4150	0.2155	0.1772	0.1703	0.2378
	(0.4236)	(0.4232)	(0.2269)	(0.2249)	(0.3437)	(0.3384)
Moved in last year	-0.1680	-0.1977	-0.0105	0.0017	-0.1575	-0.1994
	(0.1824)	(0.1814)	(0.1002)	(0.0993)	(0.1584)	(0.1564)
His Non-labor Income	0.0490 *	0.0468 *	0.0177	0.0143	0.0313	0.0325
	(0.0273)	(0.0270)	(0.0123)	(0.0118)	(0.0260)	(0.0255)
Her Non-labor Income	0.0006	-0.0085	-0.0127	-0.0130	0.0133	0.0045
	(0.0320)	(0.0320)	(0.0146)	(0.0139)	(0.0299)	(0.0299)

His Gift Income	0.0001 (0.0019)	-0.0002 (0.0019)	-0.0009 (0.0007)	-0.0011 (0.0007)	0.0010 (0.0021)	0.0009 (0.0020)
Her Gift Income	-0.0008 (0.0023)	-0.0006 (0.0023)	-0.0030 *** (0.0009)	-0.0027 *** (0.0009)	0.0022 (0.0024)	0.0021 (0.0023)
He is Enrolled Full-Time in Education	-0.5772 (0.6631)	-0.8080 (0.6670)	0.0860 (0.3211)	-0.4753 (0.3177)	-0.6632 (0.5714)	-0.3327 (0.5686)
She is Enrolled Full-Time in Education	0.0842 (0.5945)	-0.5660 (0.6096)	0.4378 (0.2900)	0.7090 ** (0.2910)	-0.3536 (0.5415)	-1.2749 ** (0.5573)

All specifications also include year and state dummies.

Standard errors in parentheses.

Asterisks indicate significance using a 2-tailed test: \*\*\* 1%, \*\* 5%, \* 10%.