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WINNING THE BREAD AND BAKING IT TOO: GENDERED FRICTIONS IN THE ALLOCATION OF HOME PRODUCTION

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ABSTRACT

We document that female breadwinners do more home production than their male partners, driven by "housework" like cooking and cleaning. By comparing to same sex couples, we highlight that specialization within heterosexual households does not appear to be "gender neutral" even after accounting for average earnings differences. One possible explanation would be a large comparative advantage in housework by women, a supposition commonly used to match aggregate labor supply statistics. Using a model, we show that while comparative advantage can match some stylized facts about how couples divide housework, it fails to match others, particularly that men's housework time is inelastic to relative household wages. Matching these facts requires some gendered wedge between the opportunity cost of housework time and its assignment within the household. We then turn to the implications for household formation. Gendered rigidities in the allocation of household tasks result in lower surplus for couples where women out-earn men, providing a microfounded reason for substantial literature showing that lower relative earning by men decreases marriage rates. We show this mechanism—allocation of housework, rather than norms about earnings—plays a role by relating marriage rates to home production allocation in US immigrants' countries of origin.

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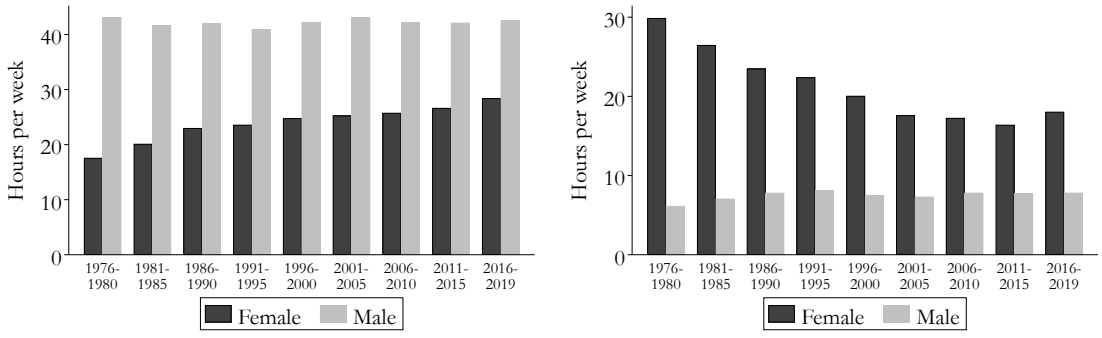
1 Introduction

Women's labor force participation and the gender wage gap have plateaued over the last twenty years, following decades of progress, and despite continued growth in women's educational investments (Blau and Kahn, 2007, 2017). At the same time, marriage rates have been falling and have stratified significantly by socioeconomic status. In this paper, we propose that friction in reallocating home production time from women to men as women's earning power grows may play a role in both puzzles. As shown in Figure 1, using data from the Panel Study of Income Dynamics (PSID), as women's labor hours have increased and their housework hours have fallen in line with the introduction of time-saving home technology (Greenwood et al., 2005), men's housework time has remained completely flat since the 1980s. If heterosexual couples cannot "reverse specialize" by having the male partner take on more home production when the female partner earns more, this could both limit women's time for market production and reduce the surplus from female high-earner unions, and thus their likelihood of forming. Therefore, while many public policies have focused on leveling the playing field at work, our evidence points to an important role for household dynamics in shaping broader trends. This paper both documents the profound gender asymmetries in the allocation of housework and for the first time demonstrates empirically that they are linked to lower marriage rates for potential couples where women out-earn men.

Figure 1: Housework and Work Hours Over Time: PSID



(a) Work Hours (b) Housework Hours

Notes: This figure shows mean levels of hours per week spent on market work (Panel (a)) and housework (Panel (b)) across year bands for men and women in married or cohabiting couples. Both couple members are aged between 20 and 55 years old. Data are from all years between 1976-1996 and the odd years between 2001-2019 of the Panel Study of Income Dynamics.

We first document a puzzling stylized fact using data from the American Time Use Survey (ATUS): women who are breadwinners in heterosexual relationships spend more time on home production than their male partners. In every other couple type – heterosexual couples with male breadwinners, lesbian couples, and gay couples – the breadwinner spends less time on home production than the non-breadwinner. More startlingly, this is driven not by childcare, but rather chores like food preparation and cleaning.

We use a model to investigate whether the source of this seeming misallocation could be comparative advantage by women in housework tasks, even when they are higher earners. This assumption has frequently been used to match aggregate female labor force participation levels in structural literature, but how well it performs in predicting the micro allocation of housework within couples has not been adequately tested. Thus, we incorporate gender-specific housework productivity into a standard efficient household model where men and women distribute their time between labor, leisure, and household production, with each partner potentially differing in wages and household productivity. In this model, women who earn more (and thus have an absolute advantage in wage-earning) can indeed be allocated more housework if they have an even larger advantage in the efficiency of home production.

While the model matches some empirical facts, it fails to match others. The model predicts that home production assignment should be according to its opportunity cost in the labor market, which means multiplying the productivity advantage of women by the wage ratio. The dual of the household's utility maximization problem is a cost minimization problem: What is the cheapest way to get a certain level of utility? We show that households violate such cost minimization in two ways.

First, we examine what happens when households form and separate using the PSID. In line with an analogous trade model, forming a household allows couples to specialize, with women's home production time going up, and men's going down. But the model predicts this specialization should be gendered only insofar as it is cost reducing (assuming household production is not a luxury good). We find instead the opposite: The total implied cost of housework *falls* upon divorce. That is, the wage of each partner times the hours of housework is lower in divorce, the "closed economy" without access to specialization or returns to scale, than in the "open economy" of marriage.

Second, using the ATUS, we show that men's housework time is not responsive

to the wage ratio within the household. This upends a comparative advantage explanation, where the relative impact of a productivity advantage lessens as the wage advantage increases. Men whose wives have a wage more than two times their own do approximately the same amount of housework as those whose wives earn less than half their wage. This is true even among households where both partners are in hourly-pay occupations and thus have the flexibility to reallocate men's time into housework and women's time into market work, which would increase the total household budget when the female partner outearns the male one.

As further evidence, we divide households into 20 quantiles by relative wages and include sole earners. At this finer level, we still see men fail to adjust their housework time and market work time as wages change. While women appear to "optimize" by shifting their work hours and home production hours as their earning power shifts, men change their time allocation very little from the 10th to the 90th percentile of relative wages. Even when men become non-working, with a very low opportunity cost of time, the small increase they exhibit in housework time is dwarfed by their increase in leisure time. These facts suggest some kind of gendered wedge between the opportunity cost-minimizing allocation of housework and households' actual behavior.

To show this pattern holds for stable characteristics impacting wages, rather than being driven by transitory shocks, we next predict wages using education and other factors. We show that in heterosexual relationships, women are far more responsive than men to their predicted portion of household wages when allocating time between market work and housework. However, this does not hold in gay relationships, suggesting that heterosexual gender roles may play a part in the patterns we observe.

A gendered rigidity in the allocation of home production produces a stark implication: marriages where wives out-earn husbands will generate less surplus than those where husbands out-earn wives, holding total household income equal. This provides micro-foundations for the results that there appear to be "missing marriages" where wives out-earn husbands (Bertrand et al., 2015), that marriages decline when men's income falls relative to women's (Autor et al., 2019), and that couples prioritize male earnings over female earnings in moves (Jayachandran et al., 2023). It also provides a new insight in a broader literature showing that the relationship between male and female earnings impacts marriage and divorce (Wilson, 1987; Feyrer et al., 2008; Gimenez-Nadal et al., 2012; Killewald, 2016; Bertrand et al., 2021; Bursztyn et al., 2017; Folke and Rickne, 2020; Kalmijn et al., 2007), emphasizing the role of

men's performance of home production, rather than, for example, stigma against high-earning women, as a possible channel decreasing real, not perceived, surplus from these marriages.

To test that our channel plays a role, we seek a setting where willingness to perform housework may vary, since our model predicts that this, rather than men being threatened by women's earning power, drives the lack of female high-earning marriages. We use variation in the ratio of women to men's unpaid home production time in the country of origin for US immigrants, in the spirit of Fernández and Fogli (2009). We first show that this home-country ratio is indeed predictive of the gendered allocation of home production in the US. We then show that being in a marriage market where women's relative earnings are higher predicts ethnic outmarriage and non-marriage much more for immigrants from a country where men do less home production. Coming from a country with strong stigma against women earning more, by contrast, does not predict a stronger impact of relative earnings on outmarriage and non-marriage.

Together, these findings demonstrate that the gendered allocation of housework may have several downstream effects, including impacting women's time allocation in the labor force and marriage behavior by women who are likely to out-earn potential spouses, which is more common among lower-earning couples. Importantly, the policy implications of stigma against female earning versus inability or unwillingness by men to do housework differ. For example, home economics classes for men have rarely been proposed as a potential antidote for falling marriage and birth rates.

Our paper relates to several literatures. The fact that heterosexual women perform more housework than their partner has been documented with regularity, and remains true even in developed economies across multiple countries, time periods, policy landscapes, and levels of gender progressivity (Europäische Kommission, 2004; Bittman et al., 2003; Rizavi and Sofer, 2010). Additionally, there is consistent evidence that within couples, looking at both the cross section and in panel data, women's home production is not highly correlated with their relative income in the household (panel data: Bertrand et al. (2015); Bittman et al. (2003); Ciasullo and Uccioli (2024), cross section: Rizavi and Sofer (2010); Sevilla-Sanz et al. (2010); Amarante et al. (2024)). In fact, both Bertrand et al. (2015) and Bittman et al. (2003) present empirical results showing women's housework increases as they earn more than their spouses. Foster and Stratton (2018) show the impact of male job loss on household tasks. Our paper

reproduces these results while adding additional ones and testing their interpretation through the lens of an efficient household model with comparative advantage.

Household specialization is foundational in economics, and has often been attributed to biological differences and / or gendered socialization of boys and girls, producing comparative advantage (Becker, 1993; Browning et al., 2014). However, this advantage is often assumed to be in childcare, not chores such as cleaning and cooking. Moreover, the need for specialization in more routine production tasks is assumed to have fallen as technological change has decreased the time required for home production (Greenwood et al., 2005). Calibrating a model with gendered productivity differences, Siminski and Yetsenga (2022) find that a woman "would need to be 109 times more productive in market work than her husband before reaching expected parity in domestic work," which seems implausibly high. Instead of asking how large productivity differences would need to be to explain the patterns observed in the data, we focus on alternative micro-level predictions of such a model and show their inconsistency.

Our alternative model is less stark than that of Jessen et al. (2024) who assume that household tasks and labor supply decisions are taken in "separate spheres." This allows us to better match the fact that women and homosexual couples do respond to relative wages, suggesting that it is not just that both decisions are taken independently but rather that some gendered frictions make some couples respond differently than others.

Previous work has also looked at the consequences of having unequal division of household tasks on relationships. Doepke et al. (2023) shows a cross-country relationship between low home production by men and fertility rates. Suero (2023) correlates spousal household task allocation with fertility intentions, while Foster and Stratton (2019) link them to life satisfaction. García-Morán and Kuehn (2023) and Foster and Stratton (2021) correlate women's labor force participation with relationship stability. There is also evidence that suggests that individuals assume that traditional roles are more attractive and expected from respective partners (Cortés et al., 2024; Bursztyn et al., 2017). We instead look at whether exogenous factors driving differences in gender allocation of household tasks causally influence the likelihood of marriage in response to differences in the wage ratio.

Our work has important implications about the gender gap, documenting sources of heterogeneity in estimated own-wage elasticity of labor supply (Lichter et al., 2015),

augmenting a larger literature that connects marriage market patterns and intra-household dynamics to women's labor supply and labor market outcomes (Calvo et al., 2024, 2021; Gihleb and Lifshitz, 2022; Almar et al., 2024), and investigating the role and transmission of social norms on economic behavior (Akerlof and Kranton, 2000; Fernández et al., 2004; Kleven et al., 2019). It highlights that closing the gender gap in the labor market (Goldin, 2014) will require changes in gender norms that reach beyond the workplace (Bertrand, 2020) and into time allocations at home.

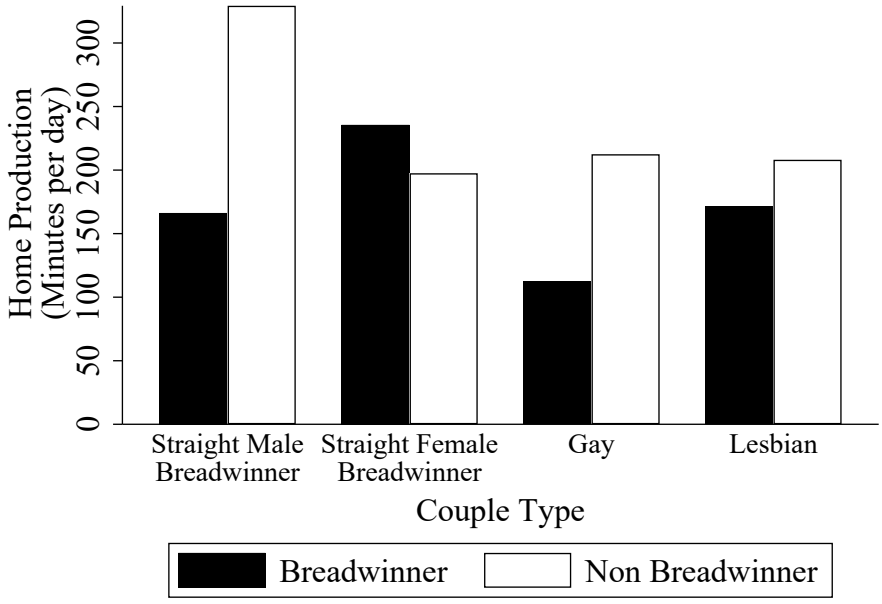
The rest of the paper is organized as follows. Section 2 documents stylized facts about household task allocation by gender and relationship status. Section 3 then proposes a model of the household to try to explain these facts and derive testable predictions on the assignment of household tasks. Section 4 shows empirical evidence relative to the model's predictions, suggesting a gendered friction in the allocation of household tasks beyond comparative advantage. Section 5 then demonstrates the implications for household formation, and tests them using the marriage behavior of US immigrants. The last section concludes.

2 Stylized Facts

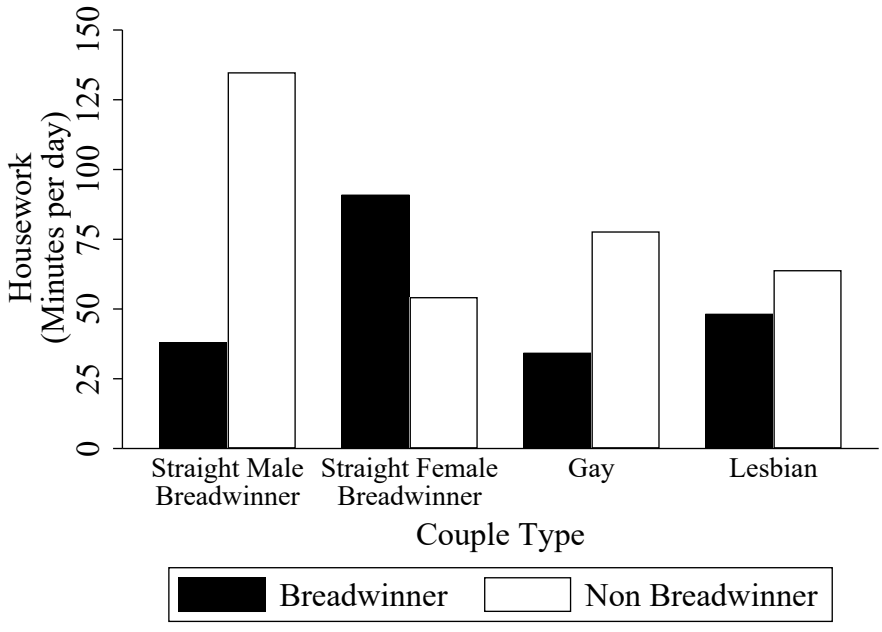
It is well known that women perform more household tasks than their spouses. The Organization for Economic Cooperation and Development (OECD) documents that women spend on average twice as many minutes per week on unpaid care as their male counterparts around the world. While this could naturally represent the marital specialization proposed by Becker (1973), this section aims to document that women's excess home production persists even when they have an advantage in market work and in domains where they have no biological advantage.

Figure 1 established that men's time devoted to household tasks and market work has moved little over time, despite women experiencing large changes in both. However, it is possible that while women's earning power grew, men maintained a sufficient breadwinning advantage to justify this. We thus now document whether there is lack of responsiveness in the cross-section to differences in breadwinning status, using data from the American Time Use Survey (ATUS). Panel (a) of Figure 2 shows that in most couple types, the breadwinner does less home production than the non-breadwinner. Details on the construction of breadwinner categories for the ATUS and PSID are given in Appendix B. This is true for heterosexual couples with a male breadwin-

Figure 2: ATUS Home Production and Housework



(a) Home Production



(b) Housework

Notes: This figure shows mean levels of home production (including time spent on chores, childcare, and home management) and housework (defined as the sum of the following ATUS time-use categories: Housework; Food & Drink Preparation, Presentation & Clean-up; Interior Maintenance, Repair & Decoration) for both married and cohabiting couples. Breadwinners are determined by comparing the reported usual weekly earnings of couple members. Both couple members are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

ner, gay male couples, and lesbian couples. It is not, however, true for heterosexual couples with a female breadwinner. In these couples, the female breadwinner does more home production than the non-breadwinning male partner. Additionally, unless noted otherwise, differences in means within couple types (and between men and women more generally in later figures) are significant for all bar charts.

This asymmetry in specialization by couple type is not driven by childcare. Panel (b) shows this fact holds when we exclude childcare and focus on "housework" only, specifically cooking, cleaning, and interior maintenance and decoration. (This measure additionally aligns well with the measure used in the PSID.) While there may be biological asymmetries that result in women doing more childcare, such as the need to recover from childbirth and breastfeeding, and then further dynamic complementarities in child-rearing that could arise from this initial distribution, there seem to be fewer arguments as to why there should be a fundamental gender difference in the performance of housework tasks such as laundry and meal preparation. Appendix Figure A.1 decomposes the home production measure of Figure 2 into 5 component categories, illustrating that cooking and cleaning / interior (the two components illustrated in Panel (b) of Figure 2) form a sizable portion of tasks performed within the home, and are performed infrequently by all breadwinners except heterosexual female breadwinners.[1]

Moreover, while female breadwinners are more common in lower earning households, this effect persists in households above median household income and in post-2012 data, as shown in the Panel (a) of Appendix Table A.1. It also persists for couples where both members are college educated, and for childless couples. The pattern also holds in two additional data sets: the Panel Survey of Income Dynamics (PSID) in the US and the Household, Income and Labour Dynamics in Australia (HILDA), shown in Appendix Figure A.2.

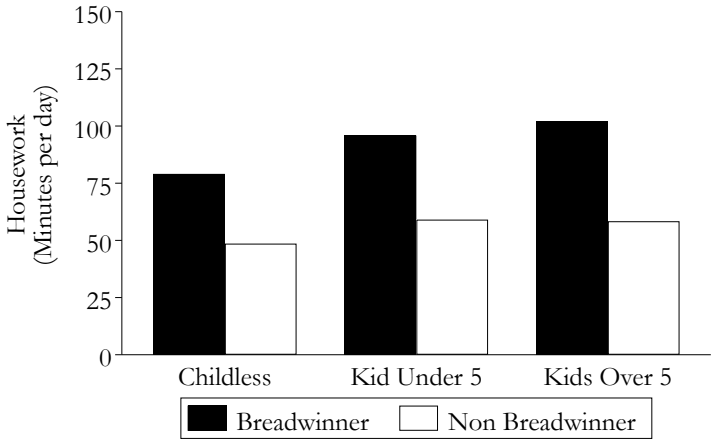
One might wonder whether this reversed pattern in housework specialization appears only because women are temporarily breadwinners, and after experiencing "child penalties," they will then be the lower earner, and thus specialization follows this anticipated pattern. As a counter to this, Figure 3 shows the same reversal in housework time for heterosexual couples with female breadwinners when they are

[1]This figure also reveals that while men do more exterior and appliance maintenance, this represents a small portion of overall household time. Furthermore, while women dedicate large amounts of time to childcare, the division is less unequal than time spent in cooking and cleaning.

childless, after having a child who is under 5, and when having children over 5, by which point we may consider the breadwinning status to be more permanent.

Using the PSID allows us to show further robustness to persistent breadwinner status. Panel (b) of Appendix Table A.1 shows that breadwinning women's larger share of home production time remains present for couples where the woman was the breadwinner for at least 50% of the recorded years, and couples where the woman was the breadwinner two years before and two years after the period of observation. Thus, it is not the case that this effect only results from temporary aberrations from a male bread winner, where insufficient time passes to reallocate housework away from the female partner.

Figure 3: ATUS Housework for Heterosexual, Female Breadwinner Couples, By Age of Youngest Child



Notes: This figure shows mean levels of housework (see notes for Figure 2 for details on its construction) for heterosexual married and cohabiting couples with female breadwinners without children, with children younger than five, and with children older than five. Breadwinners are determined by comparing the reported usual weekly earnings of couple members. Both couple members are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

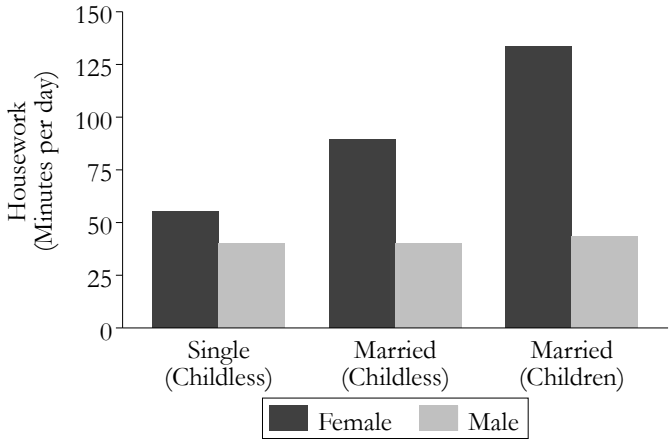
These results have been derived from cross-sectional comparisons. In case there are unobservable differences between male breadwinner and female breadwinner households that drive the allocation of housework time, we then also verify that this fact holds in the PSID with the inclusion of couple fixed effects, essentially identifying off of breadwinner changes, shown in Panel (b) of Appendix Table A.1. Appendix Figure A.3 shows this visually: when breadwinner status shifts within a couple from male to

female, the housework time allocation only changes marginally, with female partners persisting in doing much more as they become breadwinners.[2]

Finally, we examine whether these disparities in home production are likely to merely represent preferences. Perhaps men perform home production less because they do not value it. Returning to the ATUS, Figure 4 shows that while women do marginally more when single and childless than men, women's time balloons after entering into marriage, *even if no children are present in the household*. This suggests household specialization, rather than merely preferences, plays a role. We will return to these differences across marital status longitudinally in Section 4.

This evidence suggests a model in which the allocation of housework time is not gender neutral. Rather, women take on this time in marriage disproportionately, which we explore theoretically in the next section.

Figure 4: Housework of Men and Women By Marital Status and Fertility



Notes: This figure compares mean levels of housework (see notes for Figure 2 for details on its construction) across marital status for men and women. Single individuals are living alone without children. Married individuals are in opposite-sex registered marriages, living with spouses or spouses and children. All observations are drawn from couples or single households where all adult members are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

[2]Housework is regressed at the individual level on indicators for female, breadwinner, and a female-breadwinner interaction term, along with couple and year fixed effects, and then predicted housework is graphed.

3 Benchmark Model

Having demonstrated that women who are primary breadwinners in heterosexual relationships perform more housework than their male partners, and that this relationship is stable across time, household income level, and the presence of children, we now try to understand whether simple *comparative* advantage by women can explain this fact.

It has been hypothesized that men and women may experience differential costs of home production. It is difficult to think that for tasks like washing dishes or doing laundry these differential productivities could be anything other than products of gendered socialization, but we nonetheless aim to test whether differential productivity alone could explain the patterns we see. The potential for differential productivity at home has often been used in the structural labor literature (e.g., Bronson et al., 2021; Calvo et al., 2024; Erosa et al., 2022; Fukui et al., 2023; Gayle and Shephard, 2019; Goussé et al., 2017) to explain differences in labor supply across genders with success. We now explore how it can match facts regarding time use within the household instead. We thus examine the predictions of an efficient, collective decision-making model with differential costs of home production by gender, relative to actual couple behavior in the data.

3.1 Model Setup

For this benchmark model, we assume households make decisions efficiently, while having their own preferences, which is well-served by the collective model (Chiappori, 1988, 1992; Browning and Chiappori, 1998; Chiappori, 1997; Browning et al., 1994; Blundell et al., 2007). Individuals get utility from private consumption, the home produced good, and leisure. They can have gender-specific preferences for each. Private consumption is purchased through wages multiplied by work hours, while home production is produced through devoting time to it, where productivity can vary by gender. A key assumption in this model is that the cost of performing household tasks is determined by the shadow cost of what could instead be obtained in the labor market or in leisure. There is no direct utility cost of performing household tasks.

When single, households can only finance private consumption with their own earnings, and only consume as much household production as they produce. In mar-

riage, households can use either spouse's wage-earning capacity to finance consumption, and either spouse's home productivity to enjoy the home produced good. We also allow for the possibility of household returns to scale, where home produced goods may sometimes be enjoyed in greater quantities than the time devoted to them in marriage (e.g., one person cooking a meal for both).

Specifically, in singlehood or divorce, households operate in autarky, with each individual maximizing their utility in the following way:

$$U^g(c^g, x^g, l^g), \qquad g = w, m$$

where c is consumption, x are the household-produced goods and l is leisure time for each the woman (w) and man (m).

The restrictions are $c^g = w^g h^g$, where w^g represents the wage and h^g the working hours of person g and $x^w = f(T - l^w - h^w)$ for the woman and $x^m = \beta f(T - l^m - h^m)$ for the man, where $\beta < 1$ to represent the fact that he is less productive than her in household production. Let us assume that $f(0) = 0$ and $f'(0) = \infty$ such that both men and women always invest some time in household production.

Assuming an interior solution, the first order conditions imply that:

$$\frac{\partial U^w}{\partial x} f'(T - l^w - h^w) = \frac{\partial U^w}{\partial l} = \frac{\partial U^w}{\partial c} * w^w$$

and

$$\frac{\partial U^m}{\partial x} \beta f'(T - l^m - h^m) = \frac{\partial U^m}{\partial l} = \frac{\partial U^m}{\partial c} * w^m.$$

Single men and women could thus devote different amounts of time to household tasks because of their different productivity and their difference in wages as well as their different preferences for household production.

Let us now think of these two individuals of different genders forming a couple and taking decisions that are Pareto efficient. This would be equivalent to them maximizing a joint utility function given by:

$$\mu U^w(c^w, x^w, l^w) + (1 - \mu) U^m(c^m, x^m, l^m)$$

where μ represents the Pareto weight, which could depend on wages and other factors. The budget constraint for individual consumption remains the same, although

there can be transfers between spouses, so it is the joint condition: $c^m + c^w = w^w h^w + w^m h^m$. The time constraint for household production becomes $x^w + x^m = F(f(T - l^w - h^w), \beta f(T - l^m - h^m))$ where F is a homothetic, increasing function of both arguments and is at least as large as $f(T - l^w - h^w) + \beta f(T - l^m - h^m)$ to indicate possible returns to scale within the household.

The first order conditions then become:

$$\mu = \frac{\frac{\partial U^m}{\partial c}}{\frac{\partial U^m}{\partial c} + \frac{\partial U^w}{\partial c}} = \frac{\frac{\partial U^m}{\partial x}}{\frac{\partial U^m}{\partial x} + \frac{\partial U^w}{\partial x}}$$

$$\frac{\mu \frac{\partial U^w}{\partial l^w}}{(1-\mu)\frac{\partial U^w}{\partial l^w}} = \frac{F_{x^w} f'(T - l^w - h^w)}{F_{x^m} \beta f'(T - l^m - h^m)} = \frac{w^w}{w^m}$$

The last FOCs implies that:

$$\frac{F_{x^w}}{F_{x^m}} \frac{f'(T - l^w - h^w)}{f'(T - l^m - h^m)} = \frac{\beta w^w}{w^m}.$$

Since F is homothetic, the ratio of its two derivatives only depends on the ratio of x^w and x^m. We thus observe that the ratio of time devoted to household work only depends on $\beta w^w / w^m$.

This condition is the same as the one obtained if one minimizes the costs of producing the household good for each level of production. This implies that preferences for household production or bargaining power should be irrelevant in determining the share of household tasks performed by each partner. Cost minimization implies that efficient households should devote the time of the most productive partner in household tasks considering their opportunity cost. They should then compensate that household member through transfers in terms of consumption. This argument is akin to that of Udry (1996) for agricultural production.

3.2 Predictions

We now examine the predictions of the model for division of household production and labor supply between parties and for singles versus married couples.

Prediction 1: It is possible for heterosexual women who out-earn their spouses to still do more housework, as long as they have a productivity advantage that is sufficiently large.

The ratio of housework time is determined by the ratio $\beta w^w / w^m$. It is thus

possible that for β low enough, $\beta w^w/w^m < 1$ even if $w^w/w^m > 1$. In homosexual couples where there would be no difference in β, this would not occur.

Prediction 2: The ratio of time devoted to household production by the woman compared to the man should depend negatively on the wage ratio, even more strongly if women have a comparative advantage in terms of productivity.

The ratio of time in leisure should be independent of housework productivity when the utility function is separable. This implies that the within household ratio in household time compared to leisure should be constant.

The relationship between the ratio of time devoted to tasks and the wage gap is more negative as β falls. Thus, while a large productivity gap could explain why high wage women perform more household tasks than their lower earning spouses, it would imply that women who earn less than their spouse should do proportionally an even larger amount.

Overall, we should observe that the fraction of time devoted to household tasks should respond to the relative wages if the household functions in an efficient way.

The ratio of leisure time can be obtained by combining the FOCs:

$$\frac{\frac{\partial U^m}{\partial l^m}}{\frac{\partial U^w}{\partial l^w}} = \frac{\mu}{1-\mu}\frac{w^m}{w^w}.$$

β plays no role in this ratio unless x influences the marginal return to leisure of either gender. If the utility function is separable, that is not possible. Individuals who are more productive in housework work less in the labor market but do not receive more leisure.

Putting the two results together implies that:

$$\frac{\frac{F_{xw}}{F_{xm}}\frac{f'(T-l^m-h^m)}{f'(T-l^w-h^w)}}{\frac{\frac{\partial U^m}{\partial l^m}}{\frac{\partial U^w}{\partial l^w}}} = \frac{\mu}{\beta(1-\mu)}.$$

This no longer depends on the wage and thus implies that as the wage ratio increases, both household time and leisure should respond in a similar proportion.

Prediction 3: Transitions from singlehood to marriage may entail increased time devoted to housework by one partner if they have a produc-

tivity advantage in those tasks or a wage disadvantage.

When single, each partner must produce their own desired home production. When together, they can reallocate such that the most productive partner does more and keep producing the same amount of x. As long as the returns to scale of being together do not decrease the overall demand for time of partners, the partner that has the comparative advantage of household production could do more of it in marriage than in singlehood or divorce.

Prediction 4: Married households will never "pay" more for household production than single/divorced pairs of individuals, that is, $w^w(T - l^w - h^w) + w^m(T - l^m - h^m)$ **will never be larger in marriage than in singlehood or divorce as long as the income elasticity of home production is less than 1.**

We know that couples in marriage minimize the cost of producing x. Thus, for a given x, marriage will always imply a decrease in the cost of production. This will be akin to an increase in the "unearned" income of the household compared to their single status. The cost of producing household goods would increase only if an increase in such income would create such a large increase in the demand for x as for a luxury good. Estimates in the literature suggest that home production may be an inferior good (Been et al., 2020; Aguiar and Hurst, 2005; Rupert et al., 2000), while leisure time may be a luxury one (Cruz and Raurich, 2020), thus making this unlikely.

In order to obtain a tractable version of the model, we specify a type of utility function (additive logs) and a form of the production function (square-root of time) and show these results in Appendix B. In that version of the model, women work more household hours when married than when single and vice-versa for men, as long as $\beta w^w < w^m$. Men would work more than their spouse when $\beta w^w < w^m$, unless their bargaining power is such that they can enjoy large amounts of leisure.

In summary, the model predicts that women who earn more than their spouses *can* perform more home production, as long as the productivity differential is large enough relative to the wage differential. The model also predicts that the most productive partner could increase their household time when marrying. However, cost minimization also implies that the ratio of time devoted to home production must change in proportion to the wage ratio, with or without a productivity advantage by women, and households should never pay more for home production in marriage than in singlehood or divorce.

In a sense, we can think of this model as a trade model (with the added twist of

household returns to scale) where the open economy allows trade and specialization. It is possible in this model for the more productive labor market producer to nonetheless "sell" home production to her partner if she has an even stronger advantage in this domain, as shown in Prediction 1, which can only happen in the open economy of marriage. However, such specialization should be dependent on the advantage in the other domain, market work, and should rely on minimizing overall costs. Thus, a key way to summarize the predictions of the efficient comparative advantage model is that household tasks are assigned to minimize their opportunity cost, in terms of wages foregone on the market. The next section tests whether this opportunity cost minimization is displayed by couples empirically.

4 Empirical Evidence

An efficient household model with comparative advantage can predict that women who are primary breadwinners do more home production, but carries with it stark predictions about the assignment of household tasks depending on marital status and relative wages. We now turn to examining these predictions in the data.

4.1 Time Allocation in Transitions to and from Marriage

We first examine the model's predictions for marriage versus singlehood and divorce in longitudinal data. We have already shown cross-sectional evidence that married women do more housework than single women, even when childless. This can be explained in our model by the "open economy" allowing her greater productivity to benefit two people. However, in this setting, the benefits of this "trade" would need to dominate household returns to scale that are also typically thought of as a motivation for forming a household. To examine this more carefully, while holding couple-specific factors constant, and also controlling for time-varying factors like number of children, we perform event studies around marriage and divorce in the PSID, tracking how entering and leaving the marriage economy affects housework time.

Figure 5 shows these event studies, which control for the number of children present in the household and a quadratic in individual's age, to separate out the effects of additional children and the life cycle. Confirming the cross-sectional evidence, in

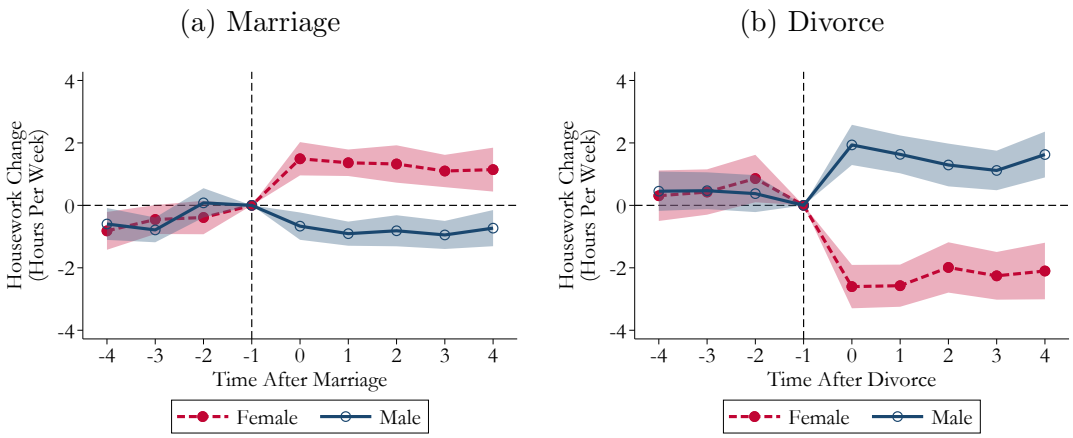
Panel (a) women's housework time goes up substantially upon marriage, showing that specialization appears to dominate returns to scale. In the longitudinal data, as compared to the cross-sectional evidence, when controlling for children and looking at the time period close to marriage, we actually see that men's housework time goes down. These findings show the potential explanatory power of the comparative advantage model, especially as compared to a model where differences in hubands' and wives' time use stem from differential preferences. Men's time in marriage going down indicates that they also enjoy home produced goods, but benefit upon marriage from the ability to "purchase" them within the marriage economy rather than self-produce them.

Panel (b) examines the impact of divorce. Upon divorce, the pattern for marriage reverses: women's housework time goes down, and men's up. Even in a model with comparative advantage, women's time going down upon divorce seems surprising given that women are more likely to be the custodial parents of children, and thus go from having two adults in the household to cook for and clean up after these children to only one. The data appear to point toward her not only performing these tasks for her children, but to her male partner actually creating a lot of the household demand for these tasks when married, without doing many of them himself.[3]

Men's time going up following divorce also provides information. First, this cannot be driven only by losing household returns to scale in chores, since otherwise women's time would also increase. Second, it shows that women's time declining cannot be due to marriage increasing returns to home production overall, since then men's time would also decline post marriage, rather than increase. And third, it again suggests that men's low housework time in marriage is not a reflection of their lack of taste for home produced goods, since they invest more time when they can no longer "purchase" these goods through the marriage trade economy.

[3]We show these same series in the HILDA in Appendix Figure A.4. They show that in the case of Australia, at the moment of cohabitation, only women's time increases without a change in men's time. For divorce, we see a pattern more similar to that of the PSID where women's time decreases and men's time increases slightly.

Figure 5: PSID Marriage and Divorce Events: Housework



Notes: This figure presents event study estimates of the effect of marriage (Panel (a)), defined as a new spouse entering an individual's household, and divorce or separation (Panel (b)) on reported weekly hours of housework performed by men and women relative to the period before the event (t=-1). Marriage and Divorce event years in the PSID are determined by the "Change in Head Marital Status" variable for individuals. Regressions include year fixed effects, state of residence, dummies for number of children present, and quadratics in the individual's age. All results are clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. To weakly balance the panel, individuals are included as long as we observe their housework data least once before and once after the relevant events. Up to three marriage or divorce events can occur for each individual, although most appear only once. Panel (a) includes data for 2930 women and 2604 men. Panel (b) includes data for 2603 women and 1796 men. Data are from all years between 1985-1999 and the odd years between 2001-2019 of the Panel Study of Income Dynamics.

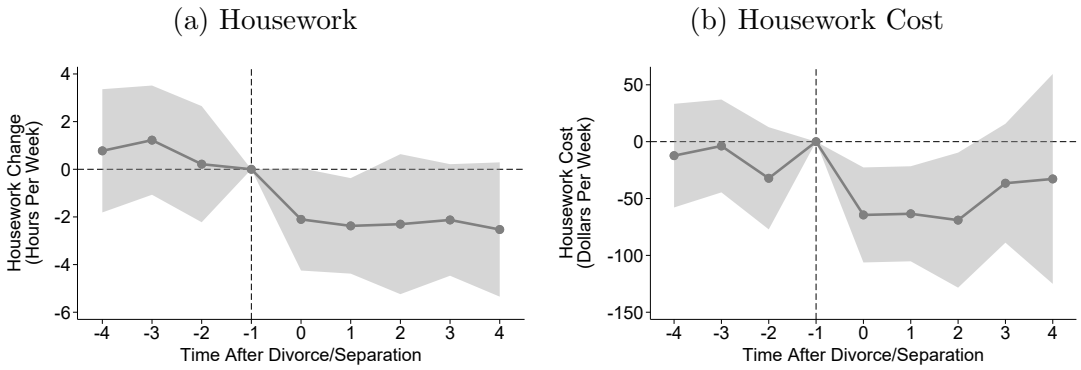
Data available in the HILDA shows that upon divorce, men's expenditure on meals outside of the home increases significantly, whereas women's is unchanged (Appendix Figure A.5). This demonstrates that men switch from "purchasing" goods within the household to both producing them and explicitly purchasing them on the market, again suggesting male demand for these types of goods.

These figures do align with prediction 3 of our model, that a partner with a productivity advantage in home production or a wage disadvantage may do more in marriage than singlehood and divorce, as long as the returns to scale in marriage are not large enough to allow both members to reduce their time. However, we next turn to examining prediction 4, that households should never pay more for home production in marriage than in singlehood or divorce.

Figure 5 already shows an inkling of something difficult to square with the model: in divorce, women's time declines by more than men's rises, showing households were spending more time on home production when married, when they could benefit from returns to scale, than when divorced, when they cannot. With returns to scale,

married households can consume more home production while spending less time on it. Additionally, specialization allows them to have the lower cost provider performing the tasks, which should also push time spent down. For total time to go up, as long as home production is not a luxury good, returns to scale must be small relative to the large gains brought by the "open economy": pairing male demand for home produced goods with female productivity in making them. But, the model says even so, the total time-cost of home production must go down, since the reason for the benefit is having someone who is more relatively productive—in wage-weighted hours—make the home produced good.

Figure 6: Housework Time and Cost After Divorce



Notes: This figure presents event study estimates of the effect of divorce in the PSID on weekly hours (Panel (a)) and the cost of weekly hours (Panel (b)) of housework performed by men and women relative to the period before the event (t=-1). The cost is calculated as weekly hours of housework multiplied by imputed wages. Wages for unemployed women and men are predicted using those employed part-time by estimating the following empirical models by gender: regressing wages on individuals' cohabitation status, a quadratic in their age, and dummies for year, state, years of completed education, and number of children in their household. The implied change in total costs in each period is calculated as the sum of women and men's estimates. Regressions include year and states of residence fixed effects, dummies for number of children present in each household, and quadratics in the individual's age. All results are clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. All individuals must be observed with non-missing housework data least once before and once after the relevant events. Panel (a) includes data for 624 couples. Panel (b) includes data for 563 couples. Data are from all years between 1985-1997 and odd years between 1999-2019 from the Panel Study of Income Dynamics.

We are able to examine this directly in the PSID by observing wages and hours spent on housework of both individuals in marriage and then divorce. In Panel (a) of Figure 6, we perform event studies for the total time spent by both couple members in housework. Panel (b) weights the outcome by each individual's wage, treating it as the shadow cost of time, thus plotting total housework cost by following both

individuals in a couple after they divorce.[4]

Surprisingly, we find that total costs are lower upon divorce, something impossible in our model,[5] where the assignment of tasks in marriage should be according to cost minimization. This result is also replicated using the HILDA dataset in Appendix Figure A.6. If households experience lower total costs upon divorce, when they lose access to efficient trade, it suggests the task allocation in marriage was skewed from what was justified by comparative advantage. It is also difficult to imagine that these lower costs upon divorce result from lower joint tastes for home production, since men's time goes up. Rather, it suggests that women were assigned more of these tasks, and men fewer, than would be efficient according to opportunity cost, and the necessary adjustment by men in divorce partly corrects this imbalance.

Having shown that the data on marriage and divorce presents some challenges to an efficient comparative advantage model, we next examine how the behavior of households across the wage ratio compares to the model's predictions.

4.2 Time Allocation Response to Wage Ratios

4.2.1 Cross-sectional Variation in Wage Ratios

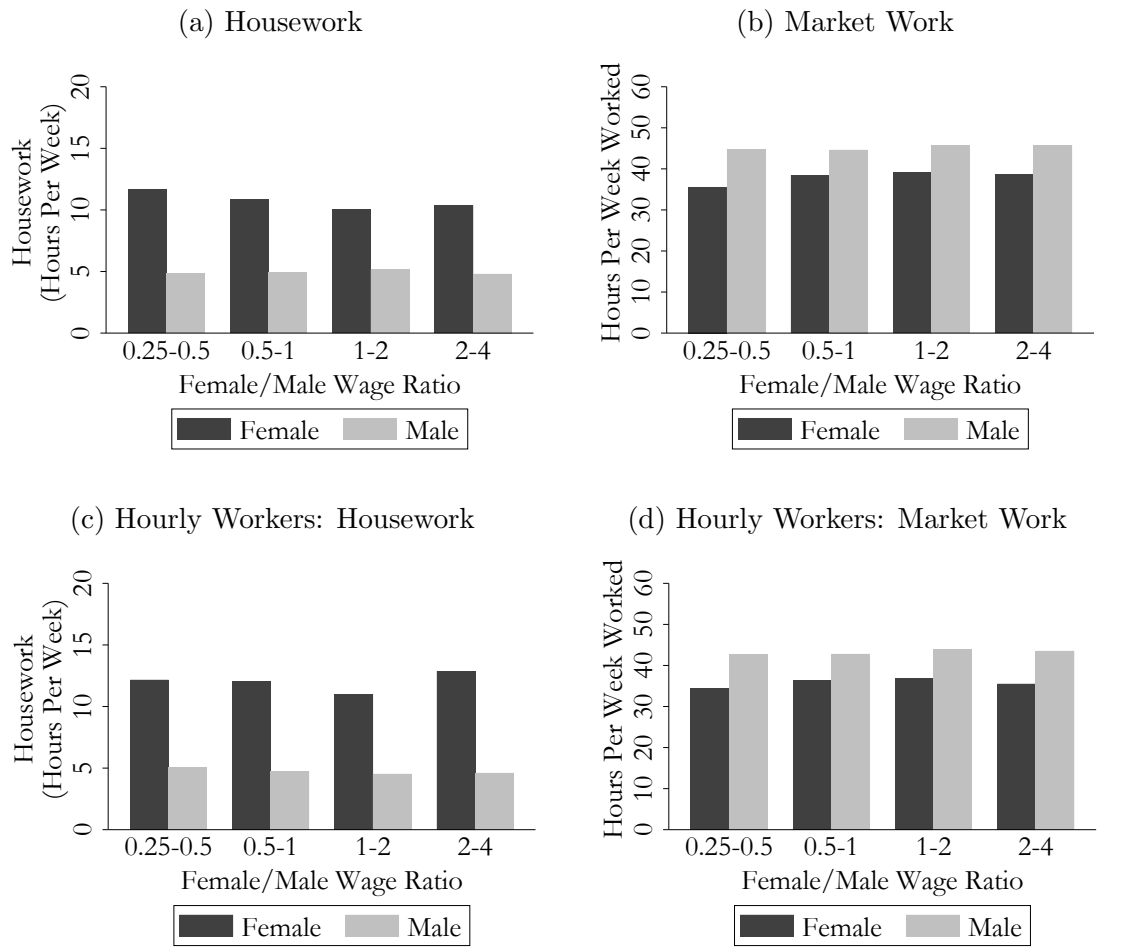
Prediction 2 states that the degree of comparative advantage must be proportional to the wage ratio between men and women. Namely, as the wage ratio of women's earnings to men's increases, this time cost disadvantage should start to cancel out women's productivity advantage. That is, the time allocation should be proportional to both types of productivity, home production and labor market production—wage. To examine this, we look at couples with varying wage ratios. We focus only on dual-earner couples so as to measure a hourly wage for each household member, but then expand to include sole-earner couples.

Using the ATUS, we group households into those where women earn a quarter to a half of their husbands' hourly wage to those where women earn twice to four times their husbands', from left to right in Figure 7.

[4]Wages for unemployed women and men are imputed using the those employed part-time by estimating the following regressions by gender: regressing wages on individuals' cohabitation status, a quadratic in their age, and dummies for year, state, years of completed education, and number of children in their household.

[5]Costs could also be higher in marriage if the household uses the cost-saving benefit of marriage to purchase much more housework, something that would only happen if housework is a luxury good, whereas evidence suggests it is inferior.

Figure 7: Dual-Earners Housework and Market Work Hours By Wage Ratio, ATUS



Notes: Panel (a) of this figure shows mean levels of housework (hours per week) for women and men in dual-earning couples grouped by the ratio of female to male wage. Panel (b) plots the average weekly hours worked per week in all jobs for men and women, again grouped by the female to male wage ratio. Panels (c) and (d) replicate Panels (a) and (b), respectively, using couples where both members are hourly workers. Wages are calculated as gross average weekly labor earnings divided by reported usual hours worked in a main job. All observations are drawn from heterosexual couples where both members are employed with non-missing earnings and hours, and are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

The figure shows that men barely alter their time allocation depending on the wage ratio of the household. Women decrease their housework as their relative wage increases (perhaps outsourcing more) but always spend much more time on home production than their male partner, irrespective of the wage ratio. Moreover, men's work hours stay stubbornly fixed at a higher point than women's across the wage ratios.

This total inelasticity of men with respect to the wage ratio, even when their spouses earn between twice and four times more per hour than them, contradicts the second prediction of the efficient model, namely that women's comparative advantage in housework over market work should be decreasing in the wage ratio. These results are replicated in the PSID (see Appendix Figure A.7) and are robust to restricting to couples with at least a college education and to those with household incomes greater than or equal to $75,000 (Appendix Figure A.8).

Notice that in Panel (b) of Figure 7, men's weekly hours worked in the labor market appear fixed slightly above 40 hours per week. One potential explanation is that men face larger frictions in setting working hours than women due to the occupations in which they are employed.

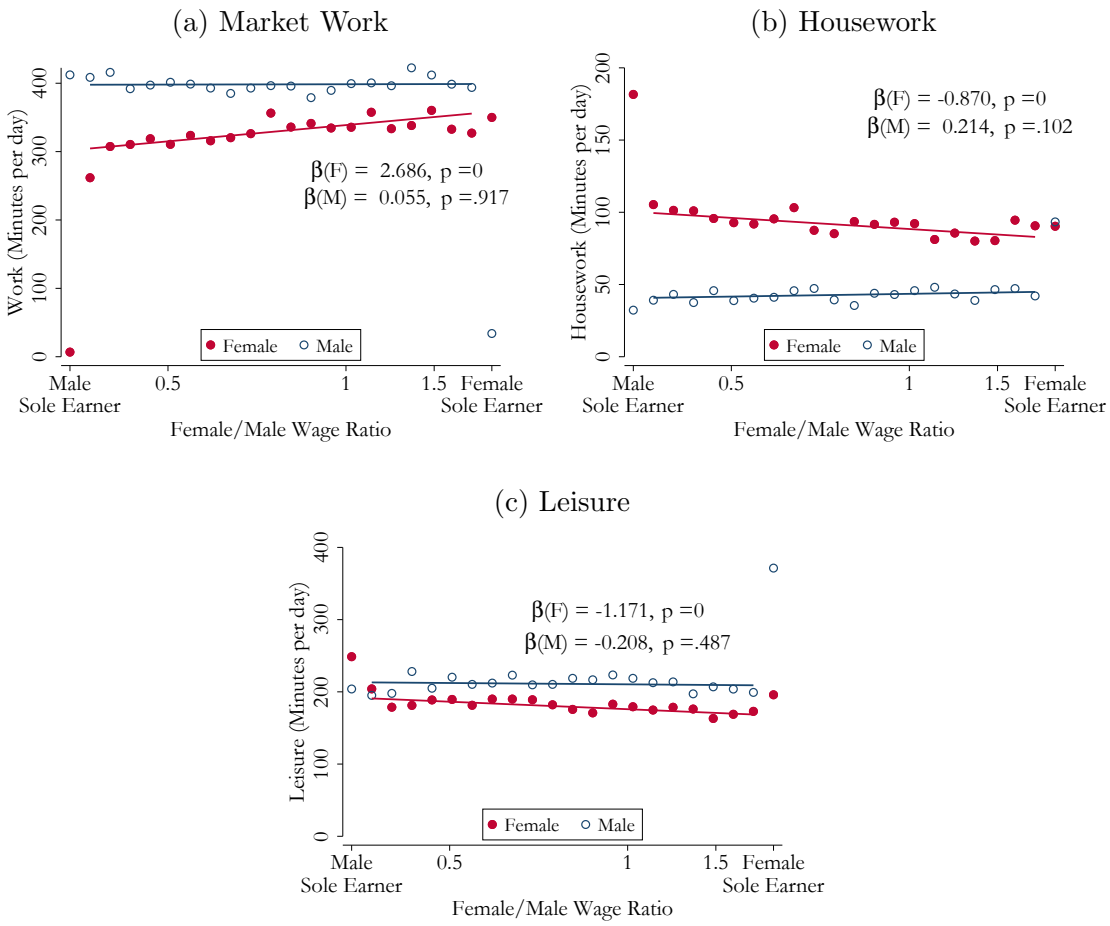
To test whether this rigidity could explain those pattern, Panels (c) and (d) repeat the exercise, this time restricting to couples where both men and women are hourly workers. This new sub-sample exhibits exactly the same patterns as before, notably with male hours worked above that of their spouses across the wage ratio groups. Notice, these households could increase total income substantially by reallocating men's time into home production and women's into market work—and have the job flexibility to do so. The fact that they do not suggests that this time allocation is not only driven by efficient comparative advantage, since if it were, this calculation would surely be different for couples where the wife earns less than half what the husband does to where she earns more than double.[6]

These figures also highlight the connection between what occurs in the household and what occurs in the workplace. The high earning women at the far right of the graph work substantially less than similarly high earning men. Lack of support in home production may represent a constraint on women's time that makes it difficult to "lean in" at the office.

[6]Concerning representativeness of these hourly working couples, Appendix Figure A.9 compares household income distributions for the full dual-earner ATUS sample and for the subset of hourly couples in which the wife's hourly wage is 2–4× the husband's. The latter group is markedly underrepresented in the upper tail (≥$150,000) but is not concentrated exclusively at the bottom of the distribution; most of the mass lies in middle-income buckets (roughly $60,000–$100,000).

Additionally, Appendix Table A.2 reports the ten most common female–male occupation pairs in this subset and the cumulative share they represent. The modal pairing—a woman working in a healthcare practitioner and technical occupation with a man in a production occupation (e.g., nurse and factory worker)—accounts for about 5% of couples in this group. Overall, around 42% of these couples have women working as healthcare practitioners/technicians or healthcare support workers.

Figure 8: Time Allocations by Gender Wage Ratio



Notes: Panel (a) of this figure shows mean levels of market work (in minutes per day) for married and cohabiting women and men, grouped by 20 quantiles of the ratio of female to male hourly wages in dual-earning couples, along with single earning couples at the extremes. Panel (b) plots the average levels of housework (Cooking, Cleaning, and Interior Maintenance). Panel (c) plots average levels of Socializing, Relaxing, and Leisure. Slope coefficients (excluding the endpoints corresponding to single earner couples) and p-values for women and men are included as text. All observations are drawn from heterosexual couples where both members are employed with non-missing yearly wages and salary earnings, and are aged between 20 and 55 years old. Data are from the American Time Use Survey, 2003-2019.

We next explore even finer differences in wage ratios, including non-working spouses at the extremes. In Figure 8 we divide households into 20 equal quantiles for dual-earners, with two additional groups with either the wife or the husband as the sole earner, to examine in more detail men's versus women's behavior as earnings change. Whereas women's market work time arcs upwards as her relative earnings increase, men's stays relatively flat, with a very slight slope, with little evidence of moving toward part-time work as earnings fall. This shows one channel for why men's

housework appears to adjust so little to relative wages: their market work remains stubbornly fixed, providing less time for home production.

Similarly, while women's time in household tasks exhibits a slope toward "homemaker" as her relative wage decreases, men barely increase their housework time throughout the different wage ratio permutations. The attachment to a fixed level of market work and housework no matter the wage ratio are suggestive of forces beyond comparative advantage determining household hours.

At the point where men earn zero, where we have a female sole earner, we do see some change in men's housework, although it still does not exceed women's. And, the size of this increase is dwarfed by the amount of housework time women do when men are sole earners. This lack of male housework time is not because their job search is so time consuming: job search time is included in market work hours, which are barely above zero. This represents another channel for men's overall lack of home production time: failing to adjust home production time sufficiently when their market work hours do fall.

Looking at leisure time, we see stark evidence against the simple efficient comparative advantage model. We see that leisure does not respond to wage ratios as predicted by the model across the wage bins for dual earners. The only reaction we see to wage ratios is when women are sole earners, where men have an enormous amount of leisure time. This cannot be explained in our model, where his low shadow cost of time should dictate that he put a large portion of his previous work time into home production, however low his productivity may be, so that leisure and home production time adjust in proportion, as stated in Prediction 2. Instead, home production time adjusts up only slightly while leisure time balloons. This evidence continues to suggest gendered frictions beyond comparative advantage in the assignment of household roles.

4.2.2 Longitudinal Evidence from Promotions and Layoffs

Using the PSID, we can also look within couples, so all other traits of a couple can be held constant, and see how behavior changes when relative earnings change within the household. Figure 9, Panels (a) and (b), shows what happens when women and men experience promotions, with absolute earnings increasing by at least $5000 (in 1999 dollars). A clear gender asymmetry is present in responsiveness to the earnings changes from promotions. When women are promoted, they decrease their housework

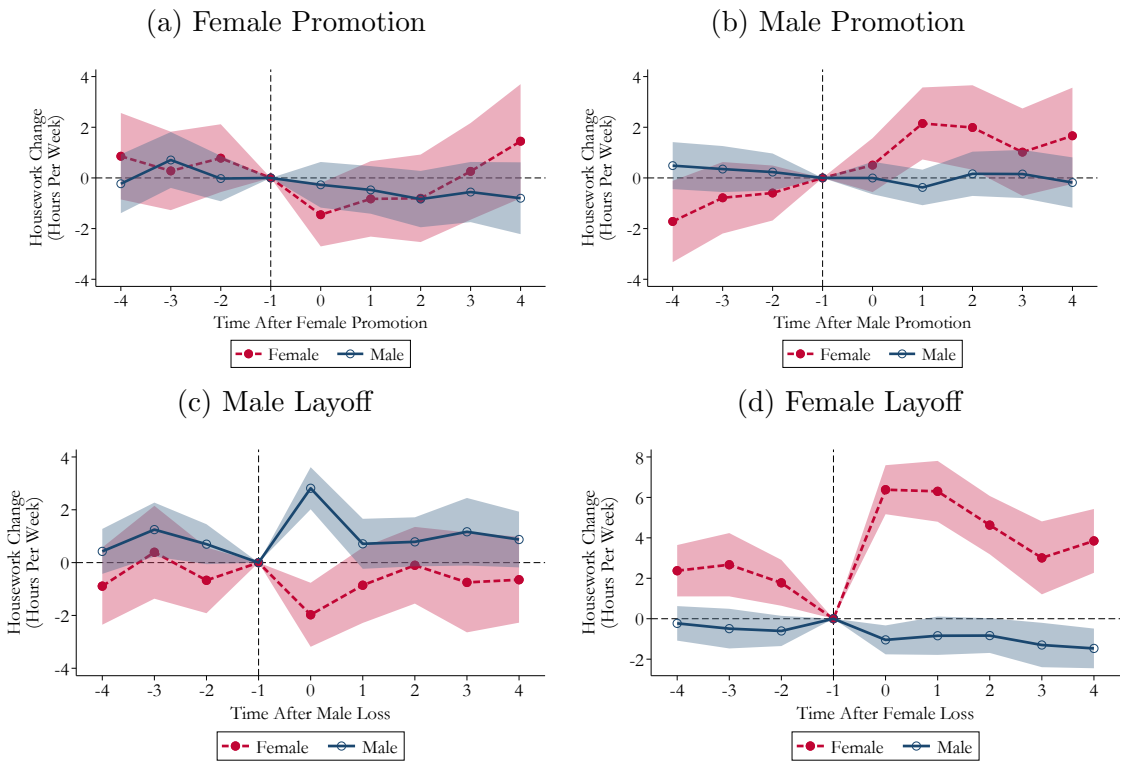
time slightly, similar to the change with respect to cross-sectional wages, but we see no increase in men's time. When men get promoted instead, we see a much sharper increase in women's housework time, but again, no change to men's time. In both cases, the response may be muted by the difficulty in re-allocating household time in the face of ingrained patterns. Thus, we next examine layoffs, where work hours are forced to change, by virtue of being separated from one's job.

Panels (c) and (d) look at involuntary job separations by men and women. These reactions are stronger, but again starkly different by gender. Men becoming laid off also represents an increase in women's relative earning power. And, indeed, we see women's time in housework decrease, although briefly. In his case, men's housework rises in the period after they are laid off, but quickly falls to pre-layoff level. On the other hand, women who are laid off exhibit a much larger and persistent increase in their housework. Figure A.10, shows annual labor earnings of both household members following promotions and layoffs, demonstrating that both events have economically significant effects on the earnings of the affected party, which are similar in both magnitude and persistence. Following the large promotions we identify, women (men) see increases of \$5,000 (\$10,000) on average in annual earnings relative to the period before the event that persist for at least three years, whereas layoffs result, on average, in equivalent drops in earnings in the period immediately following the event. While female promotions do not move relative earnings as much as the other events, rationalizing the muted response seen in housework, Panel (c) shows that the earnings of men who were laid off do not recover to their pre-period levels until four years after the event, despite the much quicker convergence of their housework to pre-period levels.

Together, these results suggest that men fail to adjust their work hours or employment status when relative earning power is low, do not adjust home production based on relative earning when job status is fixed, and then when job status does change, under-respond in housework time despite the low shadow cost of their time. These mechanisms suggest a possible identity channel behind men's under-performance of housework tasks: That is, perhaps it is *experienced* as costly for men to perform these tasks, rather than actually being costly in terms of time spent.[7]

[7]In line with possible identity explanations, Appendix Table A.4 uses HILDA survey data to investigate the relationship between individuals' full-time employment status and life satisfaction across relationship status, while testing for interaction effects by gender. We find that for men,

Figure 9: Housework Adjustment to Job Loss & Promotion Events



Notes: This figure shows event study estimates of the impact of career events on reported weekly hours of housework. Panel (a) and (b) show the effects of promotions—defined as transferring to a new position or employer with at least a $5,000 increase in earnings (in 1999 dollars) and no change in part-time status—on women and men, respectively. Panel (c) and (d) examine the effects of layoffs—defined as job loss due to being laid off or an employer going out of business—on men and women. The analysis compares housework hours relative to the period before the event (t = -1). Regressions include year and state fixed effects, dummies for number of children present, and quadratics in both members' ages. All results are clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. All individuals must be observed with non-missing housework data at least once before and once after the relevant events. Panel (a) includes data for 382 couples. Panel (b) includes data for 585 couples. Panel (c) includes data for 1052 couples. Panel (d) includes data for 993 couples. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics.

4.3 Predicted Income and Comparison to Same Sex Couples

One could be worried that the previous results are tainted by the fact that current wages and earnings are likely to be in part influenced by past specialization. Moreover, some of the gender differences could be predicated on differences in persistence between male and female earnings. Thus, we turn to a more stable characteristic of

full-time employment status (as opposed to part-time) is significantly correlated with greater life satisfaction when cohabiting, but has no or slightly negative effects for single men. The asymmetry between the married and single effects of full-time work on satisfaction support the possibility that gender identity within marriage explains sub-optimal time allocations.

men and women that pre-dates marriage: their predicted earnings capacity, based on education, gender, and region. This measure will already take into account that men on average earn more than women for the same education level. We can then examine how households allocate time in response to this predicted earnings capacity.

We begin by predicting wages for partnered individuals using data from single individuals in the sample. Specifically, we regress wages on survey year, five-year age group indicators, region, metropolitan statistical area, and an education dummy, using only single, employed individuals. Separate regressions are estimated for males and females.[8] Then, to explore the impact of potential wages on time allocation for married individuals, we regress time in housework and market work on their expected fraction of the household wage, controlling for household average wage (since households where women earn more also tend to be poorer).

Columns (1) and (2) of Table 1 show that our main result continues to hold even when using predicted wages instead of realized ones. A man in a heterosexual relationship that goes from having a wife whose wage is a quarter of his (earning 4/5 of the household wage) to one who earns four times his wage (him earning 1/5) would only increase his housework time by about 2.5 hours per week. The partner of that man would decrease her housework time by 13 hours per week. Even though this approach allows for reactions to a long-term, stable characteristic, and also allows for extensive margin adjustment unlike in Figure 7, it continues to indicate a severely limited response by men. The added ability to adjust on the extensive margin and over the long-term highlights, by contrast, the steep elasticity in time use of heterosexual women. Columns (3) and (4) indicate that, for the same wage difference, the man would decrease his work hours by only 9, while his wife would increase hers by 33 (basically the difference between home-making and full-time employment). Once more we observe a larger response by both genders compared to the range presented in Figure 7, but the stark gender asymmetry in the response to relative wages continues to hold even when looking at predicted rather than actual wages.

[8]This also allows us to perform counterfactual analyses by predicting each partnered individual's wage twice: once using the regression corresponding to their observed sex, and once using the regression for the opposite sex. This is explored in Table A.3.

Table 1: Time Allocation by Predicted Wages, by Couple Type

	Opposite Sex				Same Sex			
	Hours per week spent on...							
	Housework		Market Work		Housework		Market Work	
	Male	Female	Male	Female	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frac. $\widehat{\text{HH wage}}$	-4.193***	-21.22***	15.14***	55.45***	-20.23**	-8.552	19.87	7.084
	(0.969)	(1.480)	(2.036)	(2.023)	(9.713)	(9.888)	(17.36)	(18.64)
Avg. $\widehat{\text{HH wage}}$	0.0253**	-0.312***	0.428***	0.306***	0.122	0.211	0.742**	0.546***
	(0.0108)	(0.0176)	(0.0244)	(0.0251)	(0.167)	(0.171)	(0.310)	(0.206)
Observations	34160	37169	34160	37169	224	285	224	285
M–F p-value	0.000		0.000					

Notes: This table reports estimates from regressing time-use outcomes on the share of predicted wage within a household. The sample includes same-sex and opposite-sex couples from ATUS years 2003-2019. Individuals are between the ages of 25 and 55. All errors are robust. All regressions are weighted and include fixed effects for year and number of children in the household under 18 as well as a quadratic in age. The row "SM − SF p-value" gives the p-value for the difference between the coefficients (Clogg et al., 1995) on heterosexual male and female share of predicted wage for each outcome. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$.

Columns (5)-(8) repeat the exercise for same-sex couples. The model suggests that while responsiveness to relative wages in heterosexual couples may be amplified by the productivity difference β, this would not be the case for homosexual couples who would have the same relative productivity.

We would thus expect that men and women in homosexual relationships would have a responsiveness in between that of men and women in heterosexual relationship and similar between themselves. Instead, we find that men in same-sex relationships have responsiveness to predicted wages in terms of housework that resemble that of heterosexual women. (Women in lesbian relationships appear less responsive, more like men in heterosexual relationships, although this coefficient is not significant.) These results show that men *are* able to respond to relative earnings differences in their housework provision, but only when partnered with other men!

For market work, men and women in homosexual relationships appear more similar to men in heterosexual relationships, with a muted response compared to that of heterosexual women, although these coefficients are again not significant. This suggests attachment to the labor force regardless of relative earnings may be a feature of all men, whereas under-responding in housework appears to apply to just

heterosexual men.

These results demonstrate that the lack of responsiveness by heterosexual men documented earlier does not stem only from the transitory nature of earnings differences, but rather also appear relative to earnings *capacities*. It is also difficult to reconcile these results with a model of differential productivities, as the difference between homosexual and heterosexual couples do not align with such a model. Heterosexual couples (much more so than homosexual ones) are choosing starkly different specialization patterns than earning power alone can explain. These results thus suggest that not only individual gender is at play in the patterns we have documented, but also the gendered roles present in a heterosexual relationship, continuing to suggest an identity channel for the time allocation friction.[9]

4.4 Gendered Cost of Home Production

A simple model of comparative advantage can explain some of the empirical patterns we've shown, but fails to explain the deep lack of responsiveness of intra-household time allocation to relative wages or the pattern of costs in divorce. This suggests a gendered friction beyond productivity determining the pattern of task allocation in heterosexual marriage. In this section, we briefly summarize one possible mechanism for this prediction, although we emphasize that there are other possible ways to create similar patterns. To paraphrase Tolstoy: "All efficient households are alike, but each inefficient household is inefficient in its own way."

Any friction must align with the empirical evidence presented so far, namely that:

- Women's housework time goes up upon marriage, and men's time goes down. The pattern reverses upon divorce.
- The total time spent on housework and wage-weighted cost of housework are lower in divorce than in marriage.

[9]In Appendix Table A.3, we perform a counterfactual exercise to check what market work hours and housework hours heterosexual men and women would perform if they were instead the opposite gender, or in a same-sex relationship. We find that the gender gap would disappear if straight men were to behave like straight women or vice versa. The participation gap would remain as wide if straight men were to behave like gay men, but the gap in home production would significantly shrink. This exercise helps confirm that a difference in response to underlying traits, rather than merely a difference in distributions, is driving the differences between male and female (and straight and gay couple) behavior.

- Men's housework time fails to adjust to relative wages within the household, leading female breadwinners to over-perform household duties.
- When men have zero earnings, their housework increases a small amount, while their leisure time increases substantially.
- Women's housework time is responsive to promotions and layoffs. Men's does not respond at all to promotions, and responds only temporarily to layoffs.
- Heterosexual women exhibit significantly higher elasticity to relative wage earning potential in the household than heterosexual men in both market work and housework hours. Gay men's elasticity of housework hours is more similar to that of heterosexual women.

To augment productivity differences, we suggest a cost of performing household tasks that is independent of wages, since household decisions are not "opportunity cost minimizing" if we consider wages and productivity alone. This cost needs to be related to both gender and marriage. In particular, the empirical facts point to gender roles being more active in marriage, and in particular heterosexual marriage, than in either singlehood or divorce.

For example, we could specify a disutility of household chores that men pay when married to women, above and beyond the reduced consumption and leisure that this implies. Men's utility now becomes a direct function of his housework time: $U^m(c^m, x^m, l^m, T - l^m - h^m)$. Importantly, we would have that $\frac{\partial U^m}{\partial(T-l^m-h^m)} = 0$ when the man is single or in a homosexual relationship but equal to $-\gamma$ as defined below in a heterosexual relationship. This reflects that performing household chores generates disutility only when there is a woman in the household who can perform them.

This extra cost creates a wedge between the labor market opportunity cost of household production and time allocation. Total household production time (and even cost) may increase from singlehood to marriage if the incentives generated by γ exceed the benefits of reassigning tasks to the least costly partner. When a man becomes unemployed, with his work time forced to be zero, his leisure time can increase more than with only productivity at play, since having him reallocate all available time to home production could be costly.

This leads us to conclude with an additional proposition.

Prediction 5: The ratio of time devoted by spouses to household production will be less responsive to wage ratio changes in a model with gendered cost of performing household tasks.

Because of the wedge γ, decisions of either partner will now involve other elements in their time allocation decision. This could lead the ratio of the time devoted to home production to be very different than the ratio of wages for γ large enough.

Alternative possible stories would include differential likelihood of divorce based on gender-based specialization when couples are married, differential utility from doing gender concordant tasks but only when married, or to have bargaining power increase when one follows gender norms in their time allocation. Additionally, one could set up an inefficient household with differential preferences where men have lower taste for the home produced goods than women (though they still enjoy it), and thus win the war of attrition, for example by allowing cleaning tasks to pile up until she steps in to do them to avoid an untidy home. This has the benefit of not being active in any of singlehood, divorce, or same-sex relationships. We do not aim to rule out any of these possible alternative stories—the impact of these additional gendered frictions will be largely similar. Rather, we provide an example by way of illustration of what could produce patterns more similar to what we see than comparative advantage alone.

Any gendered wedge between task assignment and opportunity cost minimization that is particular to heterosexual marriage will exacerbate the effects of comparative advantage in household task assignment. This lack of gender neutral task assignment, no matter its source, will have stark implications for household formation, which we discuss next.

5 Implications for Household Formation

A non-gender neutral assignment of household tasks can create significant implications for household surplus arising from marriages, and thus marriage behavior itself. First, a productivity disadvantage in these tasks by men decreases the gains to specialization in households where women are higher earning. Second, if households further fail to assign tasks according to even this productivity-weighted opportunity cost minimization, they will leave possible gains to specialization on the table, reducing consumption from what is possible.

5.1 Theoretical Predictions

We can use our model to demonstrate this. If individuals in the economy anticipate how household tasks will be divided if they form a household, it would affect the attractiveness of some unions versus others. The following propositions detail this.

Prediction 6: Even in a model where the only cost of performing household task is an opportunity cost, surplus from marriage will be higher for couples where the wife has a higher wage than the husband, holding the couple's average wage constant, when β is low.

By the envelope theorem, in a model without gendered cost of household tasks, the effect of an increase in the woman's wage fixing the sum of their wages is given by:

$$\frac{\partial U^g}{\partial c^g}(h^w - h^m).$$

It will thus be positive if the wife works more than her husband and negative if the opposite. Specialization has benefits here and thus making the partner who works more hours earn an even larger wage is good as it allows specialization within the household. However, if β is lower than 1, the woman could have a higher wage than her husband and still work less hours outside the home than him. In that case, increasing her wage will decrease the welfare of the household.

This will be more the case in marriage than in singlehood, in which the expression was:

$$\frac{\partial U^w}{\partial c^w}h^w - \frac{\partial U^m}{\partial c^m}h^m.$$

This would be less negative than above when β is smaller because the man would have to work more to generate his household produced goods on his own, reducing his labor supply. This is not the case when married, implying that the impact of the wife earning a higher wage is more negative when married than when both are living separately.

We next compare this result with the case of a household with additional gendered frictions.

Prediction 7: There will be an even greater wedge in surplus from marriage for couples where the wife has a higher wage than the husband when there are additional gendered frictions in housework reallocation, such as a utility cost of men performing housework in heterosexual relationships.

A gendered wedge between the actual allocation of home production and the opportunity-cost minimizing one will reduce utility more in relationships where the wife earns more, holding total income equal, because in these cases gender roles run counter to opportunity cost minimization. To look at one specific possible friction, under a model of gendered costs of household tasks, men's under-provision of household tasks, and women's greater provision, will not be very costly to a household whose wage ratios already led the woman to perform more of the household tasks. However, it will be particularly detrimental to a household where the woman has a wage advantage over her partner.

We illustrate these two predictions with a simple back of the envelope calculation, using PSID data combined with our model, in Figure 10. We calculate a marital production "surplus" by the household's total wage earnings if they divided home production according to our model given their wage ratio, but maintained the same total household production level as in the data, assuming that the household production function is quadratic in time, as in our example in Appendix B, and without returns to scale. We then subtract from this the single counterfactual: total wage earnings if they instead each produced one-half of the total home production output on their own. We present this value on the left-hand side of Figure 10. When men and women are equally productive at home, we find that there is more surplus for couples who have more unequal wages than those who have similar wages in our theoretical model, whether or not it is the man or woman who earns more.[10] This is simply emphasizing the benefits of specialization. However, when men have lower home productivity, $\beta < 1$, only couples where the man outearns his spouse are benefited by marriage.

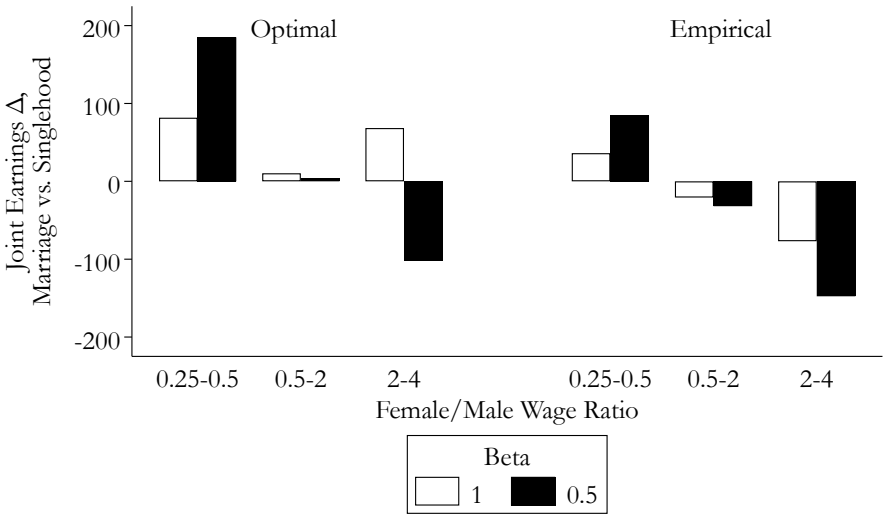
Next, instead of forcing couples when married to specialize according to our model, we calculate this same marital productivity advantage according to the actual division of labor of couples in our data, which is more gendered than the comparative advantage model supports. We show these values in the right-hand side of Figure 10. In this empirical reality, couples with a high female-to-male wage ratio do worse even with no productivity differential. That is because they ask the high-earning partner

[10]The slight difference in the graph between the 0.25-0.5 and 2-4 wage ratios is due to the density of couples at different wage ratios in those ranges. Theoretically, with no gendered productivity advantage, couples with the same wage ratio are identically well off whether the man or woman earns more.

to do a larger-than-efficient share of household tasks, leaving potential earnings on the table. Couples on the other end of the relative wage distribution also benefit less because they tend to under-specialize compared to what the model would predict. When $\beta < 1$, couples where the wife outearns her partner are even worse off. High-earning men couples, on the other hand, are better off in marriage compared to when men did not have a productivity penalty.[11]

This simple exercise illustrates that in either the case of a male productivity disadvantage in housework, or an additional gendered wedge in housework assignment, couples where the woman out-earns the man produce less benefit than those where the man out-earns the woman. This creates the prediction that fewer of these female breadwinner couples should form than in a world where time allocation was driven by labor earning capacity only.

Figure 10: Joint Earnings Marriage "Surplus" Across Wage Ratios



Notes: This figure compares optimal and empirical joint earnings with joint earnings in singlehood, separately for marriages where the female-to-male wage ratio falls into one of three ranges: 0.25–0.5, 0.5–2, and 2–4. Results are shown for two values of β (0.5 and 1), which governs male productivity in housework. Joint earnings in singlehood and optimal marriage are calculated by reallocating time use to produce the couple's observed level of housework, following the optimal time ratio specified by the model or by requiring each member to produce the total housework output separately. For further details, see the text. The sample includes heterosexual couples with individuals aged 20 to 55 years old, all of whom report working and receiving hourly pay. Data are drawn from all years between 1985 and 1997, as well as odd years between 1999 and 2019, from the Panel Study of Income Dynamics.

[11] A productivity disadvantage for men narrows the gap between the empirical allocation and the "optimal" one for high-female-earning couples, and widens it for high-male-earning couples, since in the first case the female partner does too much empirically, and in the second case too little.

We thus now turn to investigating whether there is empirical evidence that lack of efficient housework assignment, rather than only stigma against female earnings, plays a role in lower levels of household formation with higher-earning women.

5.2 Empirical Evidence on Household Formation

Our model predicts that when there is a productivity advantage for women in home production or there is gendered inefficiency in the allocation of household tasks, unions involving a woman that out-earns her spouse will be less attractive. There is already ample empirical evidence that women being higher earning can affect marriage rates, for which our model and empirical evidence provide a new micro-foundation. We now provide the first direct empirical test that gendered housework allocation is part of the reason for this.

To do this, we need a source of variation in how much housework men do. Our hypothesis is that low relative earnings by men will not affect marriage rates as much when men do higher housework as it will when men do little housework. To find this variation, we consider the marriage outcomes of women who have migrated to the US, exploiting cultural differences in their countries of origin in the spirit of Fernández (2007) and Fernández and Fogli (2009), in this case in the gendered allocation of housework.

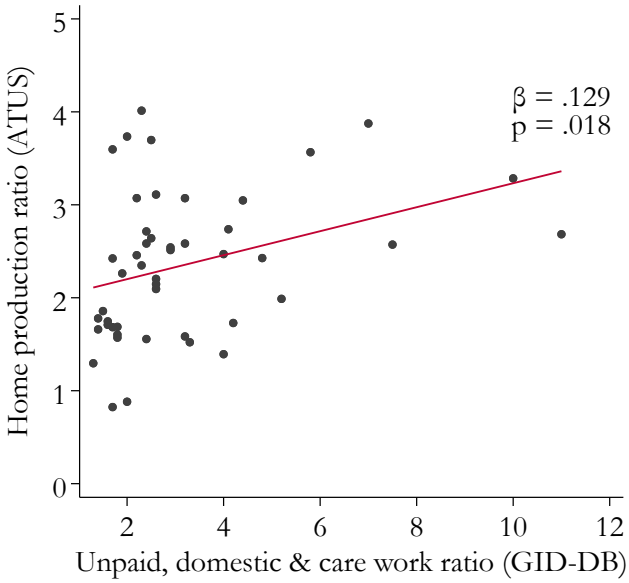
The OECD's Gender, Institutions, and Development Database (GID-DB) measures at the national level the gap in unpaid, domestic, and care work between men and women.[12] We first demonstrate that immigrants to a degree replicate the behavior of their home country once in the US. We correlate the OECD measure with the average female-to-male ratio of time in home production among individuals who immigrated to the US in the ATUS, by country of birth. Figure 11 shows that the OECD home country ratio is indeed predictive of this ratio between men and women for working age individuals in the US. We do not expect a perfect correlation, as many forces may impact the ratio of home production by men and women who immigrate to the US, including selection in immigration and differing economic circumstances and structures in the US.[13] Nonetheless, the relationship suggests that cultural norms

[12]These data are compiled from various National Statistical Offices by the United Nations Statistics Division. Ninety-two countries have data available between 2000 and 2022. For more information on this variable, see SDG Indicator 5.4.1. Metadata.

[13]For example, Boelmann et al. (2025) find the persistence of gender norms among migrants can vary by the destination norms.

persist to a degree upon arrival to the United States and may be used as a valid source of variation in men's tendency to perform housework, unrelated to the local marriage market.

Figure 11: Home Production Ratios among Immigrants Compared to Home Country



Notes: This scatterplot shows the relationship between: (a) the average female-to-male ratio of time in home production among a sample of immigrants by origin country; and (b) the origin countries' ratio of female-to-male average time spent on unpaid, domestic, and care work. Individuals included in the computations for (a) are between the ages of 25 and 55 and immigrated to the US. Data for (a) come from the American Time Use Survey from 2003-2019, and data for (b) come from the Organisation for Economic Cooperation and Development's Gender, Institutions and Development Database (the exact sample may differ by country, but should be representative of working age adults). The β coefficient and associated p-value are from the weighted regression of the ATUS immigrants female-to-male ratio on the OECD GID-DB origin country female-to-male ratio. Countries are included in analysis more than 10 immigrants list them as their country of origin in ATUS over the sample period.

We now turn to testing our model's prediction, that higher relative earning power by women will be more costly, in terms of marital surplus, when gender roles in the assignment of housework are more rigid. Assuming that individuals prefer to marry within their ethnic group (something commonly shown in the literature, for example, Ahn, 2020; Bisin and Tura, 2019; Choi and Tienda, 2017), all else equal, we define marriage markets at the ethnic group–MSA level.[14] Within such a local marriage market, we regress women's marriage rates on the ratio of women's earnings to men's in that locality, interacted with the home-country home production ratio.[15] Our

[14]In Figure 11, ethnicity was defined by reported birthplace, as ATUS does not contain ancestry data. For ACS data, the ancestry variable is more detailed and reliable as an ethnicity marker.

[15]In Table A.5, we conduct the same exercise using the probability that a woman out-earns a man.

model provides a prediction on the interaction of these two elements: women facing disfavorable earning ratios combined with disfavorable home production ratios would be more likely to marry outside their ethnic group or to forego marriage altogether. Thus, for individuals from the median marriage age to ten years above median, we look at the probability of non-marriage or outmarriage, with either outcome demonstrating a lower anticipated surplus from an ethnically homogomous marriage in this market.

To reflect expectations about relative earnings that are somewhat exogenous to current economic conditions, we use the gender ratio of income of never-married men and women of the same ethnic group, living in the same metropolitan area, who are between the 25th and 75th percentiles of marriage age for women, in the years when the target individual was of college age (18-21).[16] This lag in the income ratio calculation captures the respondent at a critical period of information acquisition and expectation formation prior to making marital decisions. Because of this "look back" requirement, we focus on 2022 in our main analysis (as ACS data where we can access income by MSA $\times$ ethnicity only goes back to 2005), but use a related methodology to expand the sample in Appendix Table Table A.6.[17]

Specifically, we will estimate how the probability that an individual i of ancestry a living in metropolitan area c chose to marry an individual out of their ethnic group or to not marry (y_{iac}) relates to the anticipated income ratio interacted with the home-country home production ratio as follows:

$$y_{iac} = \alpha + \beta \text{Income ratio}_{act} + \delta \text{Income ratio}_{act} \times \text{HP ratio}_{a} + \mu_a + \nu_c + \varepsilon_{iac},$$

where μ_a represents ancestry fixed effects (which absorbs the main effect of $HP\ ratio$) and ν_c represents MSA fixed effects).

[16] We extract the 25th and 75th percentiles of age at marriage for women under the age of 60 in each year (to limit the influence of late, second marriages). The percentiles are based on the full sample within a given year, and are not specific to any particular marriage market. Typically, this range corresponds to ages between 20 and 29. For the marriage outcomes, we focus on women who fall between the median age at marriage and ten years beyond that, to allow for marriages to have already taken place.

[17] The median age of marriage in our 2022 data is 25, such that the age range of individuals in our final sample is 25 - 35. Individuals aged 35 were of college age between 2005 and 2008; the former is the earliest year with available MSA over which marriage markets is defined. Using earlier years of ACS data creates a sample that is unbalanced across age. For Appendix Table A.6, to expand the sample to 2015-2022, we instead use an income bucket from ten years prior to year of data collection (so, in 2015, the income calculations is performed over 2005-2008) to keep a similar age distribution in the sample across all years.

Table 2: Ethnic Outmarriage and Singlehood by Home Production Time Ratios in Country of Origin

	Never/Out-married			Out-married		
	(1)	(2)	(3)	(4)	(5)	(6)
Income Ratio × HP Ratio	0.198***		0.196***	0.229***		0.229***
	(0.0601)		(0.0645)	(0.0803)		(0.0807)
Income Ratio × Earnings Stigma		0.0266	0.00558		0.0165	0.000807
		(0.0646)	(0.0671)		(0.0667)	(0.0670)
Income Ratio	0.0372	0.00874	0.0387	0.0616	0.0251	0.0618
	(0.0358)	(0.0449)	(0.0444)	(0.0525)	(0.0522)	(0.0526)
R^2	0.188	0.187	0.188	0.198	0.197	0.198
Observations	4137	4137	4137	2549	2549	2549

Notes: This table reports the results from regressing marriage decisions on the female-to-male income ratio in metropolitan area and home production ratio and earnings stigma in country of origin. The sample includes immigrant women aged 25 - 35 from the 2022 American Community Survey who immigrated to the US when they were 21 or younger. Data on home production ratios and earnings stigma in countries of origin come from the Organization of Economic Cooperation and Development's Gender, Institutions, and Development Database (2023). All errors are clustered at the marriage market level. All regressions include controls for age at immigration and wage income as well as fixed effects for age, education, country of origin, and metropolitan statistical area. See Appendix Figure A.7 for a discussion of weighting and sample composition. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Results presented in Table 2 show that when a woman lives in a marriage market where she is more likely to out-earn her potential partner and comes from an ethnic group where household production is particularly skewed towards women, their rates of non-marriage or out-group marriage increase substantially. Column 1 demonstrates this effect for all women in their choice to delay marriage or out-marry, while Column 4 examines out-marriage conditional on marriage. In both cases the interaction of a high female-to-male income ratio and a high female-to-male home production ratio has a large and significant positive impact on the probability of delaying marriage or marrying outside one's ethnic group. The home-production ratio is standardized so that the coefficient represents the impact of a one SD increase, interacted with a one point increase in the income ratio (e.g., from 1 to 2). This combination produces an almost 20% increase in delayed or outmarriage, and 23% increase in outmarriage conditional on marriage. The income ratio on its own has a positive, but statistically insignificant coefficient.

We next test whether a driver of this is simply a correlation between a dis-favorable home production ratio and stigma against women being high earning. If men prefer to marry women that earn less than them, as the literature postulates, and this preference is greater in countries with worse home production time ratios, this stigma could be an underlying omitted variable in the relationship we document. Therefore, we include a measure of "earnings stigma": negative attitudes towards women's income. This measure comes from the same OECD data from which the international home production time measures are taken, and captures the proportion of the population aged 18 or older agreeing that: "If a woman earns more money than her husband, it's almost certain to cause problems." While this measure is correlated with the home production ratio, there is still significant variation in each independent of the other. We also standardize this measure so it is in the same units as the home production ratio, standard deviations, and thus the coefficients are comparable. Columns 2 and 4 show that contrary to the hypothesis where our HP ratio simply captures sexist attitudes, we see that the interaction with earnings stigma is not significant on its own. When we include both the home production ratio and earning stigma, in columns 3 and 6, we see that only the home production ratio is significant. This suggests that the reason why women from ethnic groups that distribute tasks more unevenly at home delay marriage or out-marry more when they are more likely to out-earn potential co-ethnic partners is not linked to generic gender attitudes, but specifically to the allocation of tasks at home.

These results are consistent with our model where marital surplus is smaller when a woman both outearns her spouse and will be anticipated to perform more household tasks no matter her relative income. They suggest for the first time that widespread evidence of lower marriage rates when women's relative incomes rise may be linked to gendered rigidity in allocation of home production.

6 Conclusion

In this paper, we document some surprising stylized facts about women's home production time: women who are the household breadwinners do more housework than their partners in heterosexual couples, despite other couple types specializing in housework according to breadwinner status. We show this is not driven by childcare, is not driven by anticipating the arrival of children, and cannot be entirely attributed

to preferences, since single men and women have much more similar time allocations.

Some have tried to explain these facts by arguing that socialization may create differential productivity in home production between men and women. We build a collective decision-making model with differential costs of home production, and show that it can indeed match breadwinning women doing more home production than their partners, due to their comparative advantage. However, the model also predicts that couples should be "opportunity cost minimizing" which we show does not seem to be the case in the data: men are particularly non-responsive to wage ratios, households spend more on household tasks when married than single or divorced, and gay and lesbian couples exhibit starkly different specialization behavior. This suggests a model where something more than skill—however deeply gendered—is at play.

Together, our model and empirical evidence suggests that marriages where women out-earn men will not only be stigmatized, but will actually be less efficient, since the gendered nature of housework makes specialization less valuable when the female partner earns more money, as it will be more costly to have her specialize in home production.

We provide the first empirical test of this particular channel by examining ethnic out-marriage when relative wages interact with the home production ratio in one's country of origin. We show that when women out-earn men in a local ethnic marriage market, the effect on ethnic out-marriage and non-marriage is driven by the extent to which men underperform home production in their country of origin, not by stigma against women earning more.

Our paper provides evidence that men's inability or unwillingness to do home production may play a substantial role in both what is holding women back in the labor market and in why relative earnings matter so much for marriage. This has substantial policy implications if we believe marriage has ancillary benefits, and relative earnings are not equally distributed, with poor women being both more likely to out-earn their spouses and less likely to marry. Consider that white men out-earn white women at any percentile in the earnings distribution where earnings are positive, but one must go to the 82nd percentile of the Black earnings distribution for Black men to out-earn Black women.[18] Black women have the lowest marriage rate of any US racial group, which our model provides new insight into. Given that women considering these marriages have reason to doubt that "reverse specialization" will

[18]Data from the 2019 ACS.

occur, marriage will be a lower-surplus proposition than in a market where men earn more. Thus, the next frontier of gender equality may be encouraging men to "lean in" at home, including teaching home production skills and changing norms about task provision from a young age. This will allow men to maintain competitiveness on the marriage market even in an environment where their labor market advantage fades.

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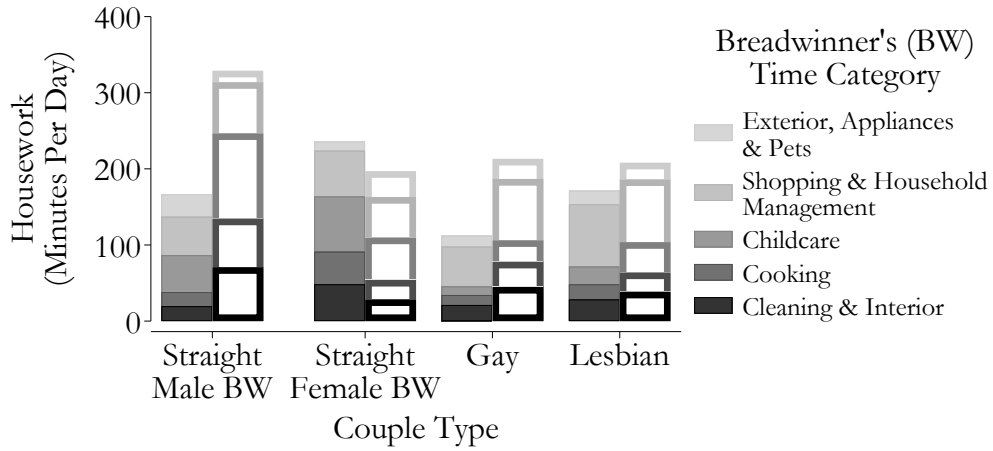
A Appendix Figures and Tables

Figure A.1: Housework Decomposition by ATUS Couples



Notes: This figure shows mean levels of home production for breadwinners (solid color) and secondary earners (hollow) in both married and cohabiting couples decomposed into its separate ATUS time-use category components:
(1) Cleaning and Interior Maintenance, Repair & Decoration
(2) Food & Drink Preparation, Presentation & Clean-up
(3) Childcare
(4) Shopping and Household Management
(5) Exterior Maintenance, Repair & Decoration, Lawn, Garden, Pets, Vehicles, and Appliances
Breadwinners are determined by comparing the reported usual weekly earnings of couple members. Both couple members are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

Table A.1: Housework Gap Robustness in ATUS & PSID

Panel A: Housework (minutes per day) —PSID & ATUS Female Breadwinners

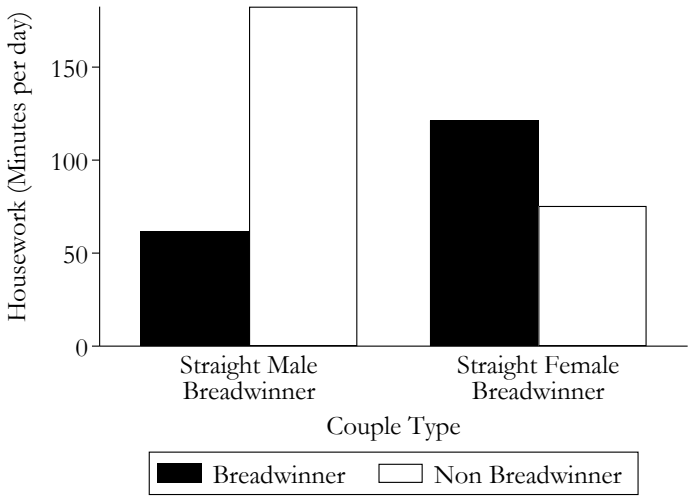
	All	Above Med. Inc.	Post 2012	Both College	Childless	All	Above Med. Inc.	Post 2012	Both College	Childless
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ATUS					PSID				
Straight Male Low Earner	-44.06***	-41.07***	-35.64***	-37.76***	-38.75***	-25.06***	-24.31***	-22.51***	-17.54***	-23.28***
	(1.647)	(2.161)	(2.578)	(3.214)	(3.653)	(1.977)	(2.337)	(2.586)	(4.146)	(2.247)
Couple Fixed Effects	N	N	N	N	N	Y	Y	Y	Y	Y
Observations	19320	10480	7784	7968	5575	9883	4350	3787	2114	3800

Panel B: Housework (minutes per day) — Restricted To PSID Female Breadwinners With...

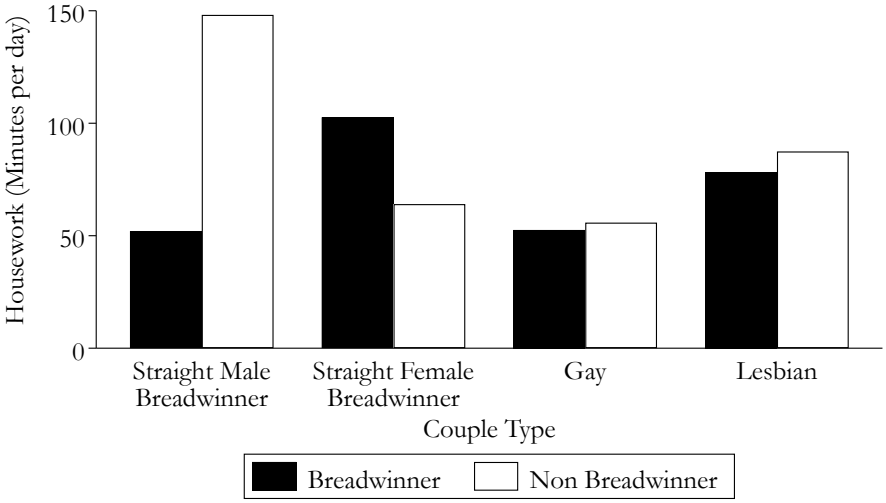
	50% Recoverable Tenure					± 2 Year Tenure				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Straight Male Low Earner	-21.23***	-22.11***	-25.33***	-15.86***	-20.57***	-17.96***	-19.15***	-21.60***	-10.76	-23.34***
	(2.685)	(2.942)	(2.822)	(4.852)	(2.535)	(3.722)	(3.860)	(4.842)	(8.439)	(4.027)
Couple Fixed Effects	Y	Y	Y	Y	Y	N	N	N	N	N
Observations	5951	2927	2949	1678	2754	3049	1662	896	740	1017

Notes: This table reports estimates from regressing housework on an indicator for being the low earner in heterosexual couples with male low earners, for the samples described below. "Above Median Income" couples have a real household income higher than the median across the full sample. "Post 2012" couples report housework on or after 2012. "Both College" indicates both couple members have at least a 4-year degree. "Childless" couples are childless. In Panel (a), Columns (1) - (5) are ATUS from 2003 – 2019. Controls include dummies for day of the week and whether the survey was completed on a holiday. Columns (6) - (10) are PSID from 2003 – 2019 and include couple fixed effects. In Panel (b), all columns use data from the PSID from 2003 – 2019. The samples in columns (1) – (5) include female breadwinners for whom at least 50% of their tenure as breadwinner is recoverable. The sample in columns (6) – (10) includes female breadwinners who maintain breadwinner status two years before and two years after the sample year. All regressions include number of children dummies and quadratics in the age of respondent and their spouse. For all PSID regressions, standard errors are clustered at the household level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Figure A.2: Housework by Couple Type: PSID and HILDA



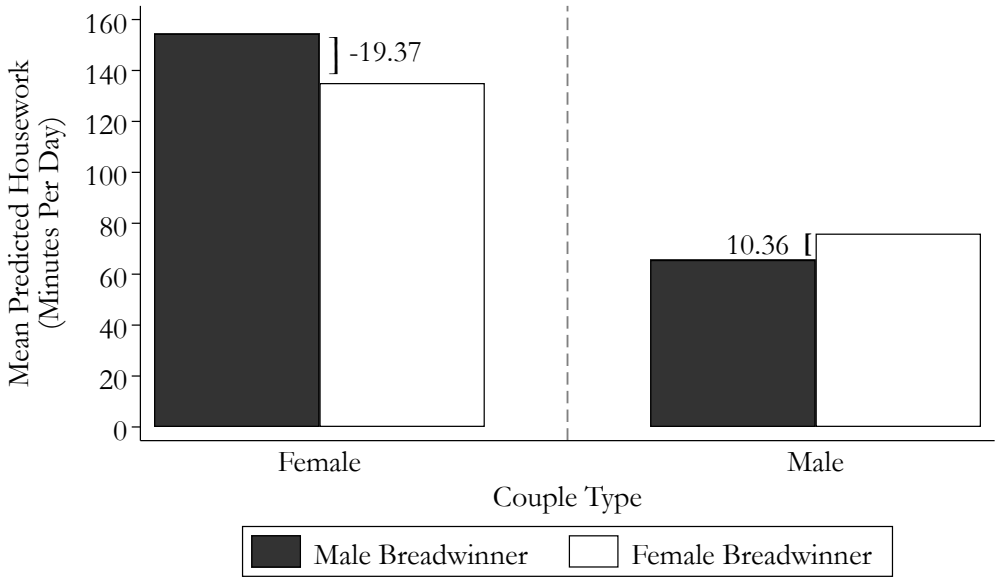
(a) PSID



(b) HILDA

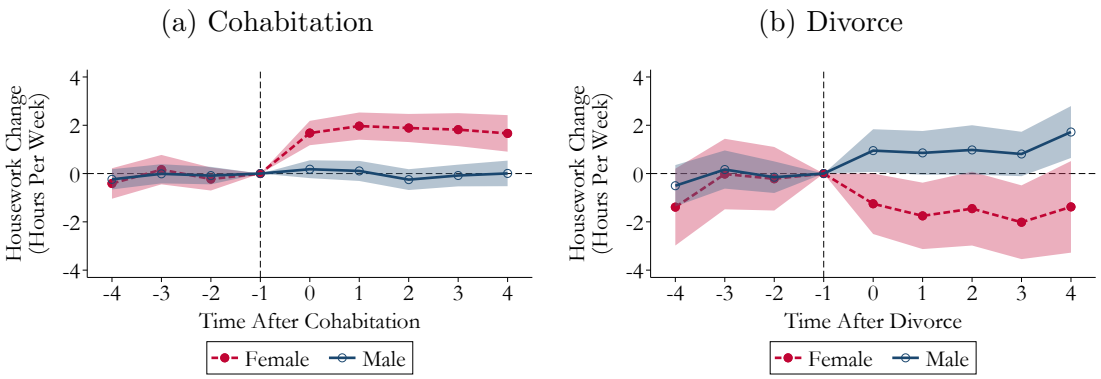
Notes: Panel (a) of this figure shows mean levels of housework (in minutes per day) for women and men in both married and cohabiting heterosexual couples. Breadwinners are determined by comparing the reported yearly labor income of couple members. Both couple members are aged between 20 and 55 years old. Housework data are the time spent cooking, cleaning, and doing other work around the house in an average week from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics. Panel (b) plots the same housework outcome for couples in the Household, Income, and Labor Dynamics in Australia survey. Housework data are combined hours and minutes per week of housework (converted to hours per week) from waves 1 through 20 from the Household, Income, and Labor Dynamics in Australia survey. Both members of couples are aged between 20 and 55 years old in both panels.

Figure A.3: PSID Housework Around Female Breadwinner Change



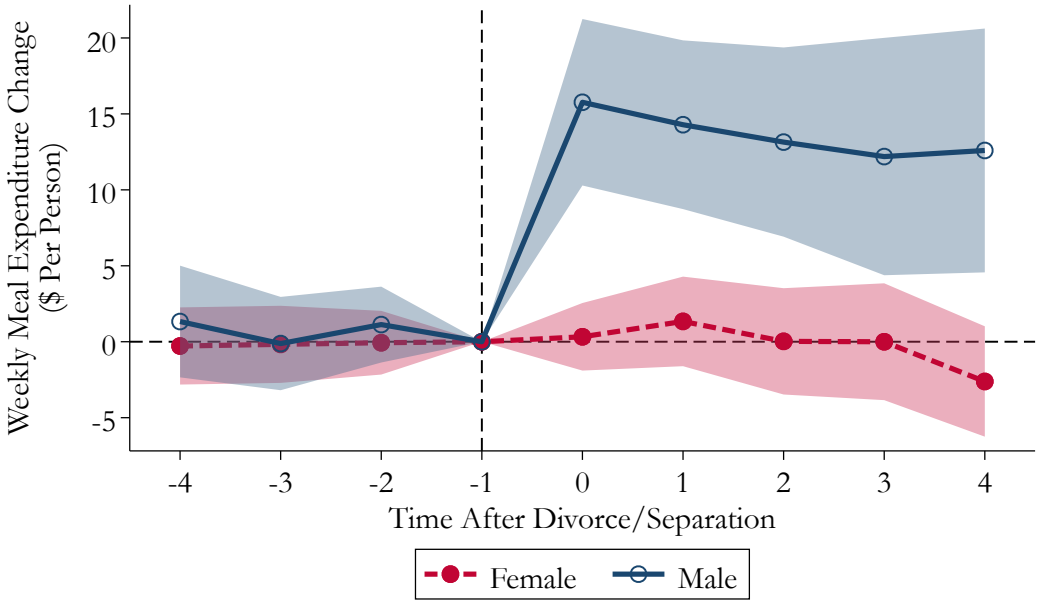
Notes: This figure plots means of predicted housework for men and women in PSID couples that experienced a change from male breadwinner to female breadwinner. Housework is regressed at the individual level on indicators for female, breadwinner, and a female-breadwinner interaction term, along with couple and year fixed effects. Predicted housework values are averaged and shown for each sex in either couple type. Differences in the average within sex are shown in text. All individuals were heterosexual and aged between 20 and 55 years old. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics.

Figure A.4: HILDA Cohabitation and Divorce Events: Housework



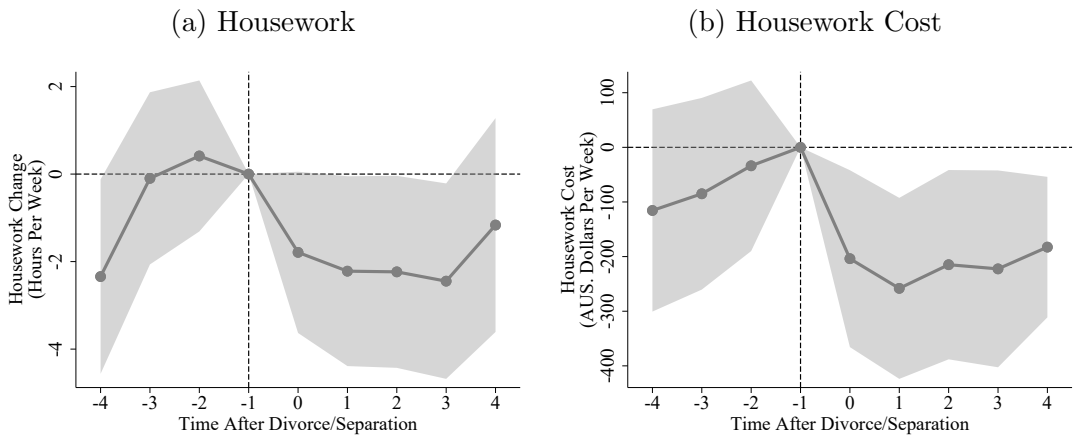
Notes: This figure shows event study estimates of the effect of partnership formation (Panel (a)), defined as a new spouse entering an individual's household, and divorce or separation (Panel (b)) on reported weekly hours of housework performed by men and women relative to the period before the event (t=-1). Regressions include year and region fixed effects, dummies for number of children present, and quadratics in the individual's age. All results clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. All individuals must be observed with non-missing housework data least once before and once after the relevant events. Panel (a) includes data from 1740 women and 1797 men. Panel (b) includes data from 450 women and 379 men. Data are from waves 1-20 of the Household, Income, and Labor Dynamics in Australia survey.

Figure A.5: Per-Person Meal Expenditure after Divorce, HILDA



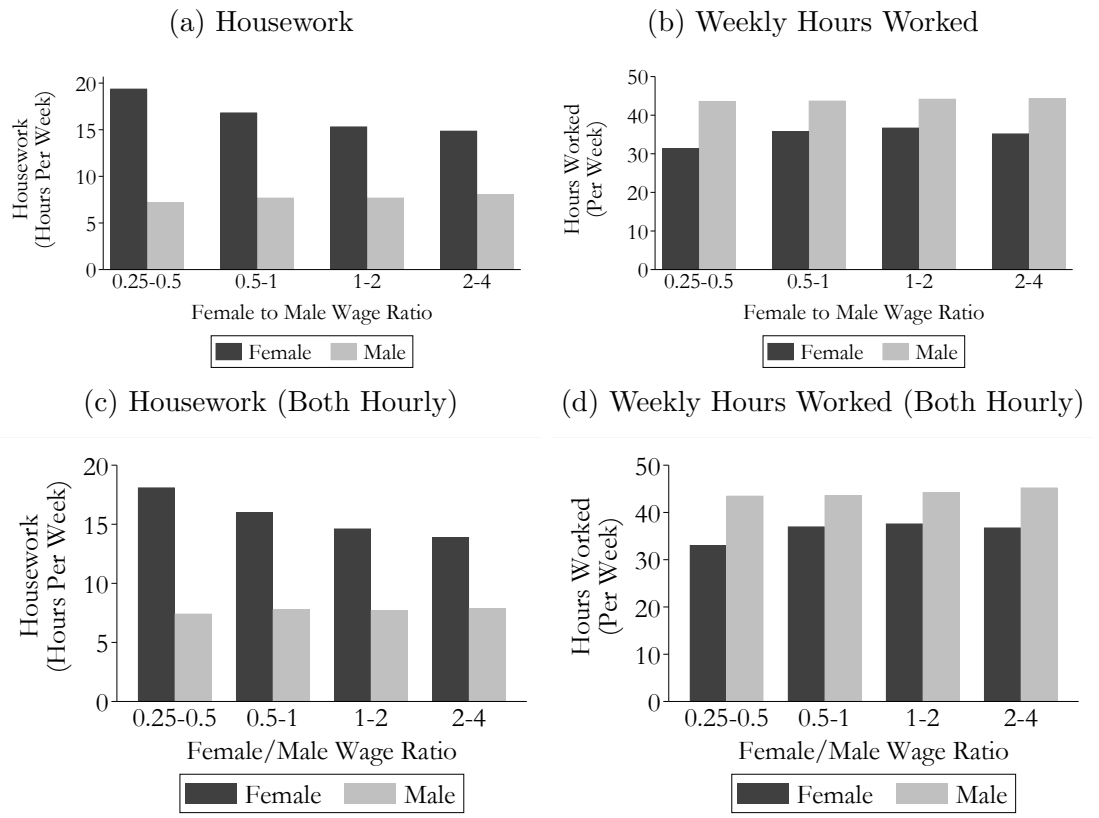
Notes: This figure shows event study estimates of the effect of partnership dissolution (divorce or separation) on imputed per-person weekly expenditures on meals outside the household for the two subsequent households after a partnership dissolves, relative to the period before the event (t=-1). Regressions include year and region fixed effects, dummies for number of children in household, and a quadratic in own age. All results are clustered at the couple level. All couples were heterosexual with both members aged between 20 and 55 years old. All individuals have non-missing meal expenditure data and are observed at least once before and once after partnership dissolution. This figure includes data from 463 men and 537 women. Data are from waves 1 through 20 from the Household, Income, and Labor Dynamics in Australia survey.

Figure A.6: Housework and Housework Cost After Divorce, HILDA



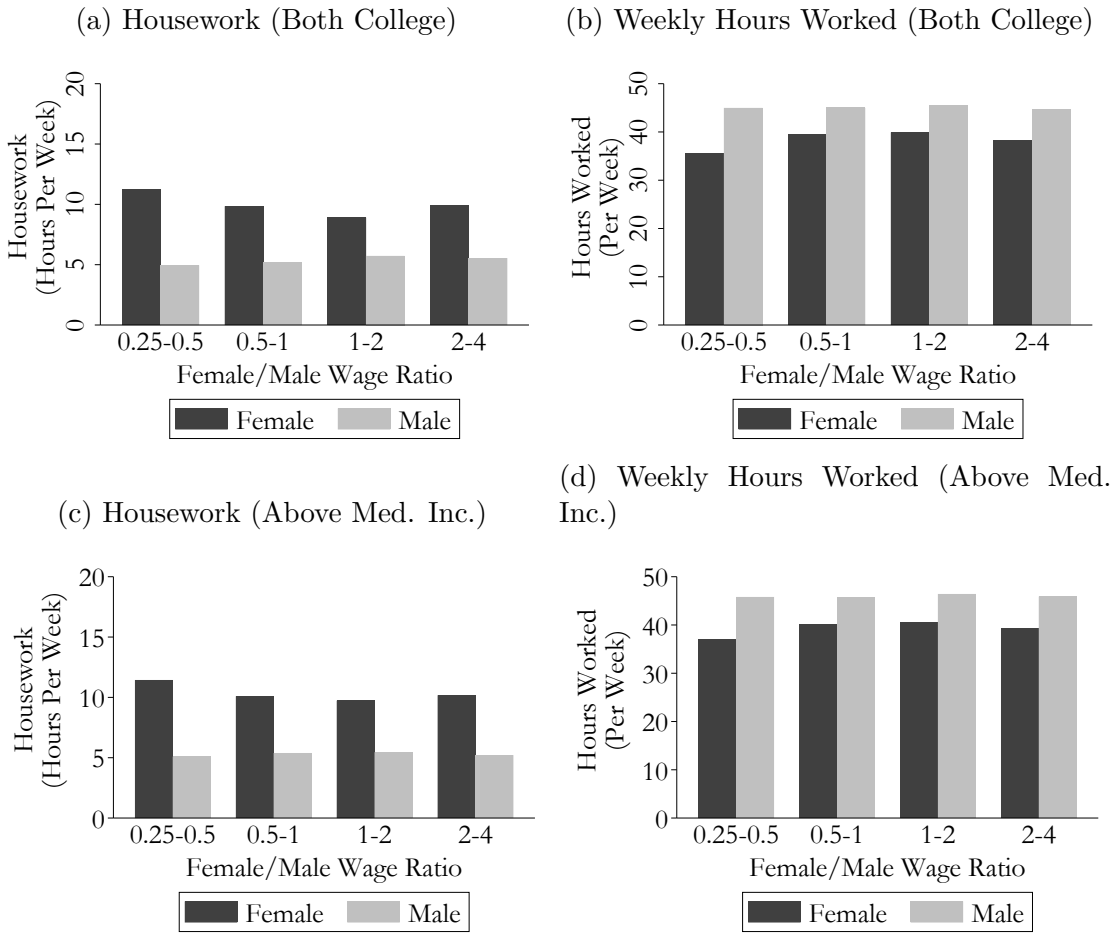
Notes: This figure shows event study estimates of the effect of divorce in the HILDA on weekly hours (Panel (a)) and the cost of weekly hours (Panel (b)) of housework performed by men and women relative to the period before the event (t=-1). The cost is calculated as weekly hours of housework multiplied by imputed wages. Wages for unemployed women and men are predicted using those employed part-time by estimating the following empirical models by gender: regressing wages on individuals' cohabitation status, a quadratic in their age, and dummies for year, state, years of completed education, and number of children in their household. The implied change in total costs in each period is calculated as the sum of women and men's estimates. Regressions include year and region fixed effects, dummies for number of children present for each household, and quadratics in the individual's age. All results are clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. All individuals must be observed with non-missing housework data least once before and once after the relevant events. Panels (a) and (b) include data for 334 couples. Data are from waves 1 through 20 of the Household, Income, and Labor Dynamics in Australia survey.

Figure A.7: Dual-Earners Housework and Market Work Hours By Wage Ratio, PSID



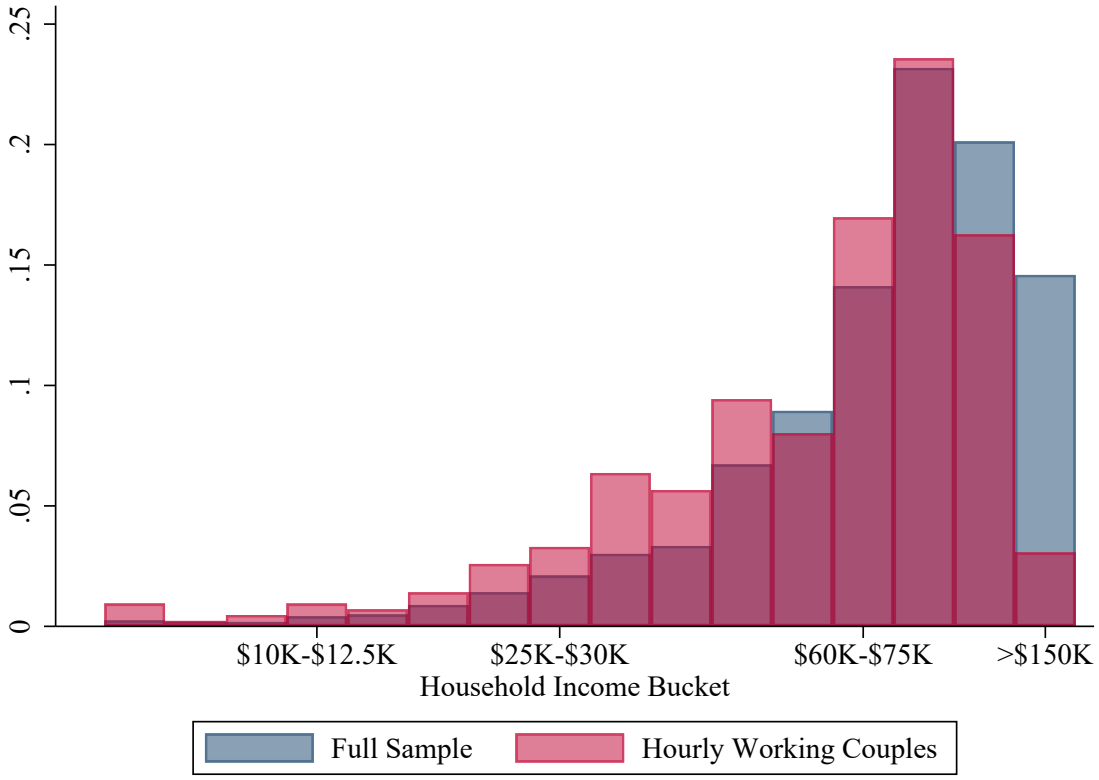
Notes: Panel (a) of this figure shows mean levels of housework (hours per week) for women and men in dual-earning couples grouped by the ratio of female to male wage. Panel (b) plots the average weekly hours worked per week in all jobs for men and women, again grouped by the female-to-male wage ratio. Panels (c) and (d) replicate Panels (a) and (b), respectively, using couples where both members are hourly workers. Wages are calculated as yearly gross labor earnings in the respondent's main job divided by yearly hours worked in the main job. All observations are drawn from heterosexual couples where both members are employed with non-missing yearly wages and salary earnings, and are aged between 20 and 55 years old. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics.

Figure A.8: Dual-Earners Housework and Market Work Hours By Wage Ratio, ATUS Robustness



Notes: Panel (a) of this figure shows mean levels of housework (hours per week) for women and men in dual-earning couples grouped by the ratio of female to male wage. Panel (b) plots the average weekly hours worked per week in all jobs for men and women, again grouped by female-to-male wage ratio. Panels (c) and (d) replicate Panels (a) and (b), respectively, using couples where both members are hourly workers. Wages are calculated as imputed weekly gross earnings in the respondent's main job divided by hours per week usually worked in the main job. All observations are drawn from heterosexual couples where both members are employed with non-missing yearly wages and salary earnings, and are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

Figure A.9: Household Income Distribution: All Dual Earners and Hourly High Female Wage Couples



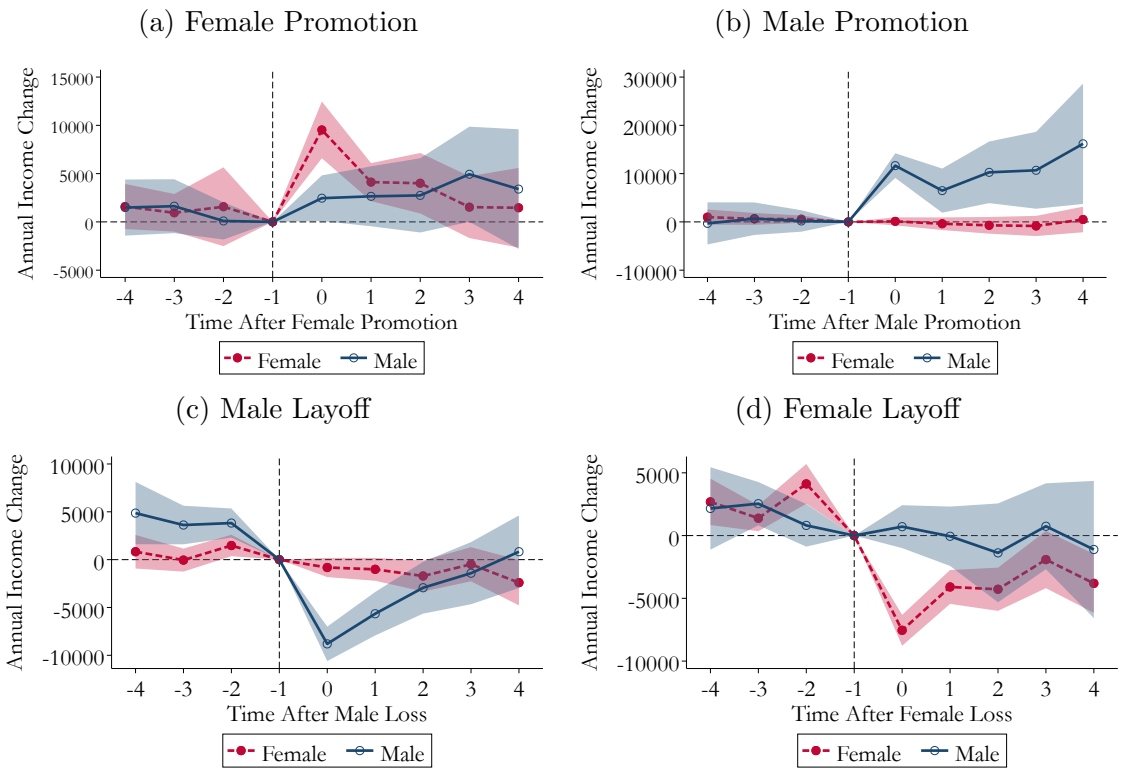
Note: This figure shows the distribution of household income (grouped into buckets of varying sizes) for dual-earning couples and the subset of dual-earning couples where both men and women are employed in hourly positions, and where the woman's wage is 2–4 times higher than the man's. Wages are calculated as imputed weekly gross earnings in the respondent's main job divided by hours per week usually worked in the main job. All observations are drawn from heterosexual couples where both members are employed with non-missing yearly wages and salary earnings, and are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

Table A.2: Counterfactual Hours Worked and Housework Time

Female Occupation	Male Occupation	Count	Cum. share
healthcare pract./tech. occs	production occs	21	4.7%
healthcare pract./tech. occs	office/admin support occs	17	8.5%
healthcare pract./tech. occs	construction and extraction occs	17	12.3%
healthcare pract./tech. occs	transport. and material moving occs	16	15.9%
office/admin support occs	transport. and material moving occs	16	19.5%
healthcare pract./tech. occs	healthcare pract./tech. occs	14	22.6%
healthcare pract./tech. occs	protective service occs	12	25.3%
healthcare pract./tech. occs	management occs	12	28.0%
office/admin support occs	office/admin support occs	11	30.5%

Note: This table lists the 10 most common female–male occupation pairs counterfactual for the subset of dual-earning couples where both men and women are employed in hourly positions, and where the woman's wage is 2–4 times higher than the man's. All observations are drawn from heterosexual couples where both members are employed with non-missing yearly wages and salary earnings, and are aged between 20 and 55 years old. Data are from the 2003 to 2019 waves of the American Time Use Survey.

Figure A.10: Earnings Adjustment to Job Loss & Promotion Events



Notes: This figure shows event study estimates of the impact of career events on reported weekly hours of annual labor income. Panel (a) and (b) show the effects of promotions—defined as transferring to a new position or employer with at least a $5,000 increase in earnings (in 1999 dollars) and no change in part-time status—on women and men, respectively. Panel (c) and (d) examine the effects of layoffs—defined as job loss due to being laid off or an employer going out of business—on men and women. The analysis compares housework hours relative to the period before the event (t = -1). Regressions include year and state fixed effects, dummies for number of children present, and quadratics in both members' ages. All results are clustered at the couple level. All individuals were heterosexual and aged between 20 and 55 years old. All individuals must be observed with non-missing housework data least once before and once after the relevant events. Panel (a) includes data for 342 couples. Panel (b) includes data for 538 couples. Panel (c) includes data for 1042 couples. Panel (d) includes data for 989 couples. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics.

Table A.3: Counterfactual Hours Worked and Housework Time

	(1) Straight Male	(2) Straight Female
Market Work Hours	41.45	26.23
...Pred. if were opposite gender	$\rightarrow$ 28.2	$\rightarrow$ 40.48
...Pred. if were in same-sex relationship	$\rightarrow$ 39.58	$\rightarrow$ 33.99
Housework Hours	4.98	14.22
...Pred. if were opposite gender	$\rightarrow$ 13.42	$\rightarrow$ 4.91
...Pred. if were in same-sex relationship	$\rightarrow$ 6.5	$\rightarrow$ 5.87
Observations	36183	40086

Note: This table presents counterfactual estimates of time use for men and women, produced through three steps:
(1) We perform two weighted OLS regressions, one for each sex, of wage on individual characteristics (year and dummies for age quantile and education, with fixed effects for region and metropolitan status) for all single, employed people. From these regressions, we obtain predicted wages for men and women using the regression for their sex.
(2) Then, for individuals in same-sex and opposite-sex relationships, we estimate the responsiveness of predicted wage to the outcome variables listed above using OLS, separately by gender and sexual orientation.
(3) Using the OLS estimates from (2), we predict the counterfactual average outcomes of straight men and women conditional on their predicted wages, had they been (a) as responsive to predicted wages as the opposite gender and (b) as responsive to predicted wage as their gender-peers who are in same-sex relationships.
The sample includes men and women between the ages of 25 and 55 from ATUS years 2003-2019.

Table A.4: Satisfaction and Employment Status

	Cohabiting			Single		
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Time	-0.0267***	-0.0257***	-0.0265***	0.0145	-0.00279	0.0123
	(0.00808)	(0.00756)	(0.00802)	(0.0107)	(0.0112)	(0.0107)
Male	-0.184***	-0.150***	-0.171***	-0.00928	0.000240	-0.00798
	(0.0293)	(0.0278)	(0.0293)	(0.0286)	(0.0285)	(0.0287)
Male × Full-Time	0.0898***	0.0685***	0.0820***	-0.0235	-0.0326**	-0.0239
	(0.0157)	(0.0148)	(0.0157)	(0.0162)	(0.0162)	(0.0162)
Linear Wage	Y	N	N	N	N	N
Earnings Flexible Poly	N	Y	N	N	Y	N
Log Wage	N	N	Y	N	N	N
Observations	70442	77194	70442	40343	39833	40343

Notes: This table includes OLS regression results for the relationship between life satisfaction and full-time employment. The first three columns of both panels restrict to cohabiting individuals, while the last three restrict to individuals living alone or with household children. Cohabiting columns include wage measures for both couple members, and single columns only include the respondent's own wage information. "Linear Wage" columns include controls for hourly wage."Flexible Earnings Poly" columns include a fifth degree polynomial of the man minus the woman's yearly earnings, or simply one's own earnings in the single columns. "Log Wage" columns include controls for logged hourly wage. All regressions include state, in metropolitan statistical area, number of children, own and spouse (if relevant) education fixed effects, and quadratics in ages of both couple members (if relevant). All errors are clustered at couple or individual level. All observations are drawn from heterosexual couples where both members are aged between 20 and 55 years old. Data are from waves 1 through 20 from the HILDA. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A.5: Ethnic Out-marriage and Singlehood by Home Production Time Ratios in Country of Origin: Probability of Out-earning Men

	Never/Out-married			Out-married		
	(1)	(2)	(3)	(4)	(5)	(6)
Prob. Outearn × HP Ratio	0.643***		0.644***	0.659***		0.672***
	(0.173)		(0.172)	(0.205)		(0.204)
Prob. Outearn × Earnings Stigma		0.0955	0.0972		0.138	0.174
		(0.197)	(0.191)		(0.214)	(0.209)
Prob. Outearn	0.126	0.0470	0.100	0.0325	-0.0440	-0.00960
	(0.168)	(0.156)	(0.148)	(0.166)	(0.171)	(0.157)
R^2	0.188	0.187	0.188	0.199	0.197	0.199
Observations	4137	4137	4137	2549	2549	2549

Notes: This table reports the results from regressing marriage decisions on the female probability of out-earning males within their marriage market, home production ratio and earnings stigma in country of origin. To calculate the probability that a woman out-earns a man within her ethnicity × MSA marriage market, we use the three-year intervals as described in Section 5, in which the respondent's marriage market is that which they observed while college-aged. Within each marriage market, we count, for every woman, the number of men she out-earns. Summing these counts across all women, we then divide by the total number of possible woman-to-man pairings in the market. This yields the probability that a randomly selected woman out-earns a randomly selected man within her marriage market. The sample includes immigrant women aged 25 - 35 from the 2022 American Community Survey who immigrated to the US when they were 21 or younger. Data on home production ratios and earnings stigma in countries of origin come from the Organization of Economic Cooperation and Development's Gender, Institutions, and Development Database (2023). All errors are clustered at the marriage market level. All regressions include controls for age at immigration and wage income as well as fixed effects for age, education, country of origin, and metropolitan statistical area. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A.6: Ethnic Out-marriage and Singlehood by Home Producution Time Ratios in Country of Origin: Expanded Sample

	Never/Out-married			Out-married		
	(1)	(2)	(3)	(4)	(5)	(6)
Income Ratio × HP Ratio	0.0641***		0.0584**	0.0925***		0.0869***
	(0.0209)		(0.0231)	(0.0230)		(0.0257)
Income Ratio × Earnings Stigma		0.0314	0.0212		0.0377	0.0237
		(0.0276)	(0.0284)		(0.0327)	(0.0333)
Income Ratio	0.0248	0.0246	0.0276	0.0415*	0.0382	0.0435*
	(0.0201)	(0.0227)	(0.0216)	(0.0242)	(0.0274)	(0.0254)
R^2	0.168	0.168	0.168	0.164	0.164	0.164
Observations	38822	38822	38822	24986	24986	24986

Notes: This table reports the results from regressing marriage decisions on income ratio in metropolitan area and home production ratio and earnings stigma in country of origin. The sample includes immigrant women aged 25–35 from the 2015-2022 American Community Survey who immigrated to the US when they were 21 or younger. Income ratios are computed using a lag of ten years from the year of data collection. Data on home production ratios and earnings stigma in country of origin come from the Organization of Economic Cooperation and Development's Gender, Institutions and Development Database (2023). All errors are clustered at the marriage market level. All regressions include controls for age at immigration and wage income as well as fixed effects for age, education, country of origin, metropolitan statistical area, and year. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A.7: Ethnic Outmarriage and Singlehood Sample Breakdown by Country of Origin

Country	Total	Proportion
Albania	15	0.0036
Armenia	21	0.0051
China	794	0.1919
Colombia	64	0.0155
Dominican Republic	213	0.0515
Ecuador	48	0.0116
El Salvador	188	0.0454
Ethiopia	17	0.0041
Ghana	12	0.0029
Guatemala	95	0.0230
Korea	205	0.0496
Mexico	2289	0.5533
Pakistan	37	0.0089
Peru	49	0.0118
Poland	52	0.0126
Spain	38	0.0092
Full Sample	4137	1

Notes: This table shows the shares of individuals from origin countries in the (unconditional) sample used in the Table 2 regressions. The sample includes immigrant women aged 25–35 from the 2022 American Community Survey who immigrated to the US when they were 21 or younger.

In all analysis performed using ATUS data, we include sample weights to account for deliberate over-sampling of weekends (see p. 12 in Bureau of Labor Statistics (2024)). In this analysis, using the American Community Survey, we exclude sample weights to reduce the degree to which the results are dominated by observations of immigrants from Mexico and China, and to preserve the variation across countries, as shown in Figure A.7.

In Table A.8, we perform the same regression as in Table 2 with equal weighting of responses by country of origin, given the distribution of ethnicities shown in Figure A.7. To create these weights, we compute the inverse of the ratio of the size of a given ethnic group in the sample to the size of the full final sample. Our findings are

robust to this adjustment.

Table A.8: Ethnic Outmarriage and Singlehood by Home Production Time Ratios in Country of Origin with Country Weighting

	Never/Out-married			Out-married		
	(1)	(2)	(3)	(4)	(5)	(6)
Income Ratio × HP Ratio	0.245***		0.290***	0.127**		0.118**
	(0.0855)		(0.103)	(0.0539)		(0.0531)
Income Ratio × Earnings Stigma		-0.151	-0.231		0.102	0.0756
		(0.187)	(0.152)		(0.106)	(0.107)
Income Ratio	-0.147	-0.124	-0.228*	0.0218	0.105	0.0526
	(0.0938)	(0.139)	(0.123)	(0.0697)	(0.0738)	(0.0753)
R^2	0.247	0.242	0.250	0.315	0.314	0.316
Observations	4137	4137	4137	2549	2549	2549

Notes: This table reports the results from regressing marriage decisions on income ratio in metropolitan area and home production ratio and earnings stigma in country of origin. The sample includes immigrant women aged 25–35 from the 2015–2022 American Community Survey who immigrated to the US when they were 21 or younger. Income ratios are computed using the years when the respondent was of college age, as described in Section 5. Data on home production ratios and earnings stigma in country of origin come from the Organization of Economic Cooperation and Development's Gender, Institutions and Development Database (2023). All errors are clustered at the marriage market level. All regressions include controls for age at immigration and wage income as well as fixed effects for age, education, country of origin, metropolitan statistical area, and year, and are weighted to account for differing prevalence of ethnic groups in the sample.

B Earnings Measures Construction

ATUS–CPS. We restrict to ATUS respondents ages 20–55 with a spouse present in the CPS household and link each ATUS respondent to their final CPS interview (MIS=8). For each couple we identify which CPS line corresponds to the respondent versus the spouse using the ATUS-updated relationship to household head (`relate_cps8`) and the CPS relation code (`cps_relate`). Couples in which both partners report disability as their reason for non-employment (`cps_whynwly`=2 for both) are excluded.

Earnings inputs are the ATUS-updated usual weekly earnings (`earnweek`, `spearnweek`), CPS usual weekly earnings (`cps_earnweek`), and, when present, CPS ASEC annual wage income (`cps_incwage`). For ATUS earnings, if an individual is not employed in ATUS and the earnings field is NIU, we set earnings to zero; otherwise NIU remains missing. For CPS weekly earnings, if an individual is not employed, disabled, or retired and `cps_earnweek` is NIU, we set it to zero.

We assign the breadwinner (BW) on the ATUS respondent's record using the following precedence: (i) compare ATUS-updated weekly earnings of respondent and spouse; (ii) if unavailable, compare CPS usual weekly earnings for couples with only the basic monthly CPS; (iii) if an ASEC interview is present, compare CPS ASEC annual wage income; (iv) if still unresolved and the respondent reports "home/family" as the reason for not working last year, code the respondent as non-breadwinner; (v) if exactly one partner is NILF in ATUS, classify the working partner as BW; (vi) if still unresolved, classify the more educated partner as BW. Residual ties are dropped. Throughout, `Breadwinner`=1 indicates the ATUS respondent is the BW and `Breadwinner`=0 indicates the spouse is the BW.

PSID. We focus on head–wife households. Annual labor income for head and wife (`hd_labor_inc`, `wf_labor_inc`) is set to zero if weeks worked equals zero; PSID special missing/flag values (including year-specific top codes) are recoded to missing. In rare cases where the female is coded as head and the head's labor income is zero/missing while the wife's labor income is positive, we impute the head's labor income with the wife's value. Post-1996 annual hours are computed as usual weekly hours times weeks worked, with flagged values set to missing.

Breadwinner is assigned by comparing head and wife labor income. When income

is missing but one partner is employed with positive annual hours and the other has zero hours or zero labor income, the working partner is classified as BW. The variable `Breadwinner` is coded on each person's line: on the head's line, `Breadwinner`=1 means the head is BW (0 means the wife is BW); on the wife's line the coding is the mirror image. We then enforce couple-level consistency within household-year so exactly one spouse is coded as BW.

Robustness. Results are robust to excluding ATUS cases resolved via the education fallback in step (vi).

C Model Appendix: An Example

To obtain more tractable results, let us assume that $U^g = \ln c^g + \ln l^g + \alpha^g \ln x$ where $\alpha^m > \alpha^w$ may be larger for men than for women and $f(.) = \sqrt{.}$.

The FOC when single then become:

$$\frac{\alpha^w}{2\sqrt{T - l^w - h^w}\sqrt{T - l^w - h^w}} = \frac{1}{l^w} = \frac{w^w}{c^w}$$

and

$$\frac{\alpha^m \beta}{2\sqrt{T - l^m - h^m}\beta\sqrt{T - l^m - h^m}} = \frac{1}{l^m} = \frac{w^m}{c^m}$$

This implies that $l^g = h^g$, that $c^g = w^g l^g$ and $x^w = \sqrt{T - 2l^w}$ and $x^m = \beta\sqrt{T - 2l^m}$. Finally, leisure time will be determined by

$$\frac{\alpha^w}{2(T - 2l^w)} = \frac{1}{l^w}$$

and

$$\frac{\alpha^m}{2(T - 2l^m)} = \frac{1}{l^m}$$

Leisure will be given by $l^g = \frac{2T}{4+\alpha^g}$, time devoted to household production would be $\frac{T\alpha^g}{4+\alpha^g}$ and men would devote more time to household production and less to leisure than women if they value more household production. They may consume more or less depending on their wages.

The total utility of each individual will be:

$$\ln(\frac{2Tw^g}{4+\alpha_g})+\ln(\frac{2T}{4+\alpha_g})+\alpha_g \ln(\sqrt{\frac{T\alpha_g}{4+\alpha_g}}) = \ln 4w^g+0.5\alpha_g \ln(\alpha_g)+(2+0.5\alpha_g)\ln(\frac{T}{4+\alpha_g})$$

Increasing the woman's wage, maintaining the sum of it constant will imply that aggregate utility will change by

$$\mu 1/w^w - (1-\mu) * 1/w^m$$

For married individuals, we have

$$\frac{\sqrt{T-l^m-h^m}}{\sqrt{T-l^w-h^w}} = \frac{\beta w^w}{w^m}$$

$$\frac{l^m}{l^w} = \frac{w^w}{w^m}\frac{1-\mu}{\mu}$$

Using the budget constraint, we thus obtain that

$$l^w = \mu h^w + \mu\frac{w^m h^m}{w^w}$$

and thus

$$l^m = (1-\mu)h^m + (1-\mu)\frac{w^w h^w}{w^m}$$

and then replacing into the initial condition, we get

$$\frac{\sqrt{T-(2-\mu)h^m-(1-\mu)\frac{w^w h^w}{w^m}}}{\sqrt{T-(1+\mu)h^w-\mu\frac{w^m h^m}{w^w}}} = \frac{\beta w^w}{w^m}$$

$$\frac{T-(2-\mu)h^m-(1-\mu)\frac{w^w h^w}{w^m}}{T-(1+\mu)h^w-\mu\frac{w^m h^m}{w^w}} = \frac{\beta^2 w^{w2}}{w^{m2}}.$$

$$h^m = \frac{T\left(1-\beta^2\frac{w^{w2}}{w^{m2}}\right)+h^w\frac{w^w}{w^m}\left((1+\mu)\beta^2\frac{w^w}{w^m}-(1-\mu)\right)}{2-\mu\left(1+\beta^2\frac{w^w}{w^m}\right)}.$$

$$l^m = \frac{(1-\mu)T\left(1-\beta^2\frac{w^{w2}}{w^{m2}}\right)+h^w\frac{w^w}{w^m}(1-\mu)\left(1+\beta^2\frac{w^w}{w^m}\right)}{2-\mu\left(1+\beta^2\frac{w^w}{w^m}\right)}.$$

$$l^w = \frac{\mu T \frac{w^m}{w^w}\left(1-\beta^2 \frac{w^{w2}}{w^{m2}}\right) + h^w \mu \left(1+\beta^2 \frac{w^w}{w^m}\right)}{2-\mu\left(1+\beta^2 \frac{w^w}{w^m}\right)}.$$

$$h^w = \frac{T\left(2\left(1+\beta^2 \frac{w^w}{w^m}\right)\left(2-\mu\left(1+\frac{w^m}{w^w}\right)\right) - \bar{\alpha}\frac{w^m}{w^w}\left(1-\beta^2 \frac{w^{w2}}{w^{m2}}\right)\right)}{\left(1+\beta^2 \frac{w^w}{w^m}\right)\left(4+\bar{\alpha}\right)}.$$

$$l^w = \frac{2\mu T(1+w^m/w^w)}{(4+\bar{\alpha})}$$

The time devoted by women at home will be given by

$$T - l^w - h^w = \frac{T\bar{\alpha}\left((1+w^m/w^w)\right)}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}$$

This will be higher than what she would do as a single woman if

$$\frac{1+w^m/w^w}{1+\beta^2 w^w/w^m} > 1$$

or if

$$w^m > \beta w^w$$

His time in the workplace would be given by

$$h^m = \frac{T\left(2(1+\beta^2 w^w/w^m)(2-(1-\mu)(w^w/w^m+1)\right) + \bar{\alpha}(1-\beta^2 w^{w2}/w^{m2})}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}$$

His leisure be given by

$$l^m = \frac{2(1-\mu)T(w^w/w^m+1)}{(4+\bar{\alpha})}$$

The time devoted by men at home will be given by

$$T - l^m - h^m = \frac{\bar{\alpha}T\left(\beta^2 w^w/w^m(w^w/w^m+1)\right)}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}$$

This will be less than what he was doing as a single man if

$$\beta w^w < w^m$$

Total household time devoted to household tasks will be:

$$\frac{\bar{\alpha}T\left(\beta^2 w^w/w^m(w^w/w^m+1)+(1+w^m/w^w)\right)}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}$$

This will be more than the sum of what they devoted as a couple when

$$\beta w^w > w^m$$

But the cost of that time will be unchanged.

The household public good will be

$$\sqrt{\frac{T\bar{\alpha}\left(1+w^m/w^w\right)}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}}+\beta\sqrt{\frac{\bar{\alpha}T\left(\beta^2 w^w/w^m(w^w/w^m+1)\right)}{\left(1+\beta^2 w^w/w^m\right)\left(4+\bar{\alpha}\right)}}$$

$$\sqrt{\frac{T\bar{\alpha}(w^m+w^w)(1+\beta^2 w^w/w^m)}{w^w\left(4+\bar{\alpha}\right)}}$$

Public good will always be larger in marriage than in singlehood.

Total household monetary resources will be given by

$$\frac{2T(w^w+w^m)}{4+\bar{\alpha}}$$

a fraction μ of which will be consumed by the woman and the rest by the man.

The couple's utility will be given by

$$\mu ln(\mu\frac{2T(w^w+w^m)}{4+\bar{\alpha}})+\mu\ln(\frac{2\mu T(1+w^m/w^w)}{(4+\bar{\alpha})}+\bar{\alpha}\ln\sqrt{\frac{T\bar{\alpha}(w^m+w^w)(1+\beta^2 w^w/w^m)}{w^w\left(4+\bar{\alpha}\right)}}$$

$$+(1-\mu)ln((1-\mu)\frac{2T(w^w+w^m)}{4+\bar{\alpha}})+(1-\mu)\ln(\frac{2(1-\mu)T(w^w/w^m+1)}{(4+\bar{\alpha})})$$

This simplifies to

$$2\mu\ln\mu+2(1-\mu)\ln(1-\mu)+0.5\bar{(}\alpha)\ln(\bar{\alpha})+(2+0.5\bar{\alpha})\ln\frac{T(w^w+w^m)}{4+\bar{\alpha}}$$

$$-(\mu+0.5\bar{\alpha})\ln w^w-(1-\mu+0.5\bar{\alpha})\ln w^m+0.5\bar{\alpha}\ln(w^m+\beta^2 w^w)$$

Increasing the woman's wage, maintaining the sum of both wages constant will imply that aggregate utility will change by

$$-\mu/w^w + (1-\mu)/w^m + 0.5\bar{\alpha}\left(-1/w^w + 1/w^m + \frac{-1+\beta^2}{w^m + \beta^2 w^w}\right)$$

This will be different than when the two individuals live apart for the additional element on the right. When $\beta = 1$ and both genders are equally productive, having both partners being more different in wages will be better as the lower wage partner will be able to devote more time to household production. So it will be more detrimental to increase women's wages in marriage than in singlehood when $w^w < w^m$. The opposite will be true when $w^w > w^m$. In addition, when $\beta < 1$, there is a more negative impact of increasing women's, even when $w^w > w^m$. That is because the most productive party now has a higher opportunity cost of time.