

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, even when restricting to “housework” like cooking and cleaning instead of childcare. By comparing to gay male and female couples, we highlight that specialization within heterosexual households does not appear to be “gender neutral” even after accounting for average earnings differences. This could be explained by either a large *comparative* advantage by women or some gendered inefficiency in the division of home production within the household. Using a model, we show that if either of these two elements are present, unions involving women who out-earn their male partners will produce lower surplus, because the time allocated to home production will be more expensive. This provides a micro-founded reason for substantial literature showing that lower relative earning by men decreases marriage rates. We test that our mechanism—allocation of housework, rather than norms about earnings—plays a role by exploiting variation in the ratio of home production time in US immigrants’ countries of origin, and find that the link between relative earning and marriage rates is indeed tied to home production allocation.

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. 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. 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.

We begin by documenting a puzzling stylized fact using data from the American Time Use Survey (ATUS): women who are breadwinners in heterosexual relationships spend more time on household chores 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 chores than the non-breadwinner. More startlingly, this is driven not by childcare, but rather chores like food preparation and cleaning.

This stark allocation appears to reflect more than preferences. Single men and women do similar amounts of housework, but women’s time on housework balloons when married, even when couples have no children. Moreover, female breadwinner’s disproportionate time on housework is not driven by anticipating “child penalties,” and thus a reversal of breadwinner status, as it persists even when women are breadwinners after having children.

We develop a framework to examine whether these patterns can be explained by women having greater productivity, whether innate or socially constructed, in housework tasks. We start by assuming efficiency in a model where households distribute their time between labor, leisure, and household production, with each partner potentially differing in wages and household productivity. To explain the fact that women who earn more (and thus have an absolute advantage in wage-earning) still do more cooking and cleaning requires that these women have an even larger advantage in the efficiency of home production.

The model also highlights that forming a household opens up partners to trade

in home production, something that they are not able to do when single, and also introduces returns to scale in the form of some portion of home production being a public good. This allows them to reallocate time spent in home production to the household member that has the comparative advantage. Depending on the relative forces of comparative advantage and returns to scale, women's home production time could go up upon marriage, and down upon divorce, as their greater productivity is utilized in the "open economy" of marriage.

We find evidence for this using event studies with data from the PSID, where women's time goes up upon marriage while men's declines. At the end of a relationship, this process reverses. Upon divorce, women do less cooking and cleaning than when they were married. This is true even though women are the primary custodial parents of children, where presumably losing the extra set of hands would create a negative impact. Meanwhile, men increase their housework time, and substantially increase their use of outsourced meals, indicating their preference for home produced goods.

The model also predicts that the total time cost of home production should go down in marriage, as higher efficiency is the reason for the reallocation. Returning to the data, we find that the time cost of home production actually is lower in divorce than in marriage, something impossible to explain in an efficient model.

Moreover, the model predicts that any comparative advantage should only be proportional to the wage ratio, and thus vary with it. In the data, we show that as women's wage rate goes from below one half her partner's to over two times his, men's home production time fails to increase. This unresponsiveness of men's household time to relative wages is not driven by lack of access to part-time work, as we show it even occurs in households where both partners are in part-time occupations, and thus truly could reallocate men's time into home production, and women's time into market work, which would increase the total household budget in households where women substantially outearn men.

Dividing households into 20 quantiles by relative earnings, we show this pattern is visible across the full distribution of relative wages. While women appear to "optimize" by shifting their work hours and home production hours in an arc as their earning power shifts, men change their time allocation very little from the 10th to the 90th percentile of relative earnings. Even when men become non-working, with a very low opportunity cost of time, they exhibit a small increase in home production

that is dwarfed by their increase in leisure time.

We also use predicted wages, rather than realized earnings, to show that this lack of reallocation by relative earning status is particular to heterosexual marriages. In same-sex male relationships, men respond just as much to their predicted percent of household wages as do women in heterosexual relationships. Counterfactual analyses reveal that these differences are driven by a difference in responsiveness to underlying factors, rather than in the different characteristics of couple types. Heterosexual men both fail to change their work hours in response to relative earning power, and fail to change their housework time when work hours are forced to adjust.

We then turn to the implications of these findings. The model, with differential productivity by gender or with inefficiency, produces a stark implication: marriages where wives out-earn husbands will generate less surplus than those where husbands out-earn wives. This provides micro-foundations for the result in Bertrand et al. (2015) that there appear to be “missing marriages” where wives out-earn husbands, and for the finding 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; Autor et al., 2019; Bertrand et al., 2020; Folke and Rickne, 2020), for the first time emphasizing the role of men’s performance of home production, rather than 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 the disadvantage from female-high-earning households is proportional to men’s housework disadvantage, rather than men simply being threatened by women’s earning power. We use variation in the ratio of women to men’s unpaid home production time in the country of origin for US immigrants. 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 marriage rates.

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 impacting marriage behavior by women who are likely to out-earn potential spouses.

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 (Kommission, 2004; Bittman et al., 2003; Rizavi and Sofer, 2010). A common explanation for this, most notably argued by Becker (1998), is that small biological differences and/or gendered socialization of boys and girls can lead to a gender gap in productivity at household tasks that endows women with comparative advantage with household tasks. In addition to Becker’s initial unitary framework, the more modern collective approach to modeling household decision making, which assumes households are efficient, also posits a dominant role of comparative advantage as members allocate time to domestic and market production according to their marginal productivities in the relevant areas (Browning et al., 2014).

Increasingly, empirical evidence casts doubt on the ability of comparative advantage alone to explain observed patterns in the distribution of housework. Women’s labor market participation and earnings relative to men have greatly increased, while their human capital investment has exceed that of men (Blau and Kahn, 2007, 2017), and technological change has greatly eased the skill investments required for home production (Greenwood et al., 2005).

Additionally, there is consistent evidence that within couples, looking at both the cross section and in panel data, that women’s home production decreases as a function of their relative income in the household, but typically stops falling as women begin to make more than their partner (panel data (Bertrand et al. 2015; Bittman et al. 2003), cross section (Rizavi and Sofer 2010; Sevilla-Sanz et al. 2010)) 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. Lastly, in a direct test of a simple, Cobb-Douglas Beckerian model of household time allocations, 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. Our work thus seeks to take these empirical regularities

and bring them to a model of marriage formation which would highlight the possible interaction between gender differences in household chores and marital surplus.

Our work has important implications for closing the gender gap (Goldin, 2014), documenting sources of heterogeneity in estimated own-wage elasticity of labor demand (Lichter et al., 2015), improving models of household decision making, and investigating the role and transmission of social norms on economic behavior (Akerlof and Kranton, 2000; Fernandez et al., 2004; Kleven et al., 2019).

The rest of the paper is organized as follows. Section 2 documents stylized facts about household tasks allocation by gender and relationship status. Section 3 then proposes a model of the household to try to explain these facts and derive conclusions about marital surplus. Section 4 shows evidence of potential gendered inefficiency in the allocation of household tasks, which we incorporate into the model in Section 5. Section 6 then tests the implication of the model for marriage behavior using US immigrants. The last section concludes.

2 Stylized Facts

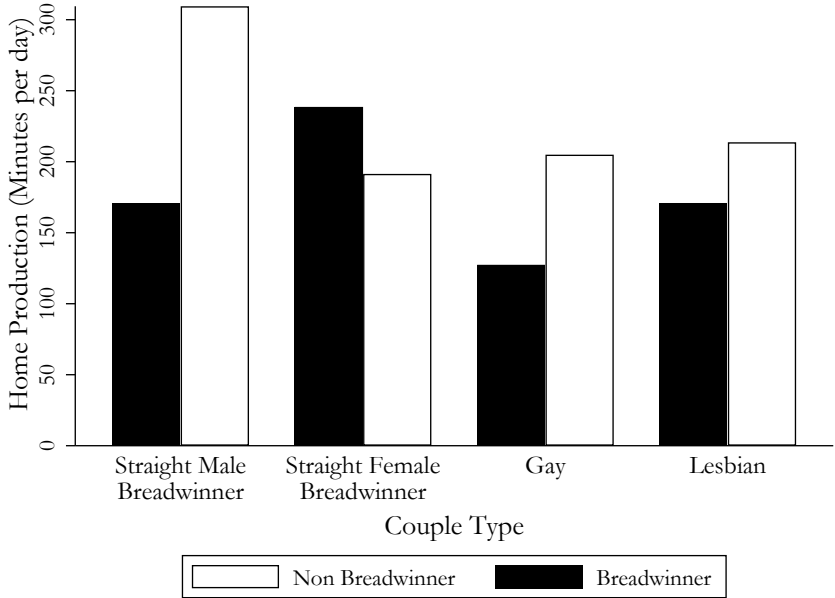
2.1 Home Production by Breadwinning Status

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 than 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 home production time is not in proportion to their earning power and exists in domains where women have no biological advantage.

We start by examining home production time by relative earnings within a couple in the American Time Use Survey (ATUS). In most couple types, the breadwinner does less home production than the non-breadwinner. This is true for straight couples with a male breadwinner, gay male couples, and lesbian couples. It is not, however, true for straight couples with a female breadwinner. Figure 1 shows that in these couples, the female partner, who is also the breadwinner, does more home production than the non-breadwinning male partner.

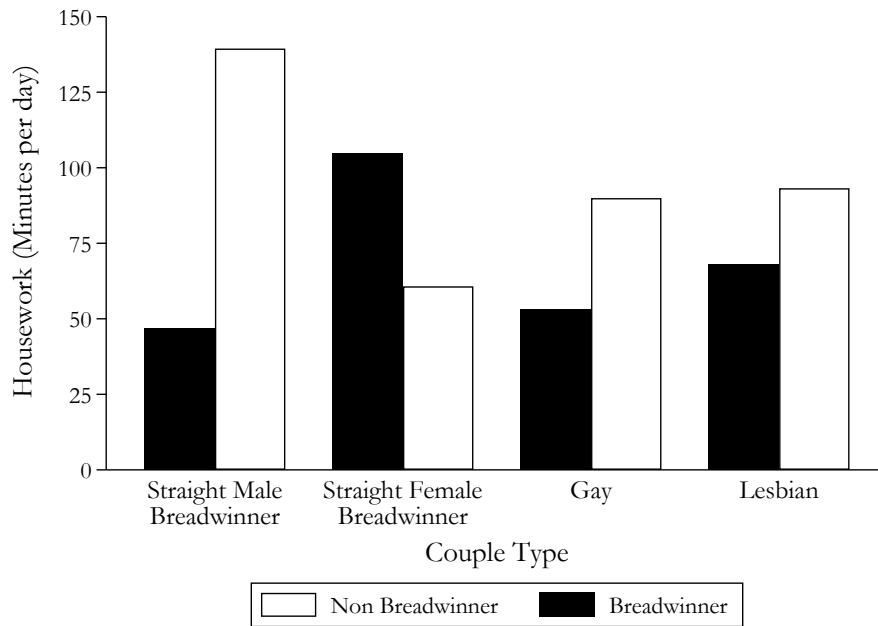
Figure 2 shows this fact holds when we exclude childcare and focus on “housework”

Figure 1: ATUS Home Production



Notes: This figure shows mean levels of home production (including time spent on chores, childcare, and home management) 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.

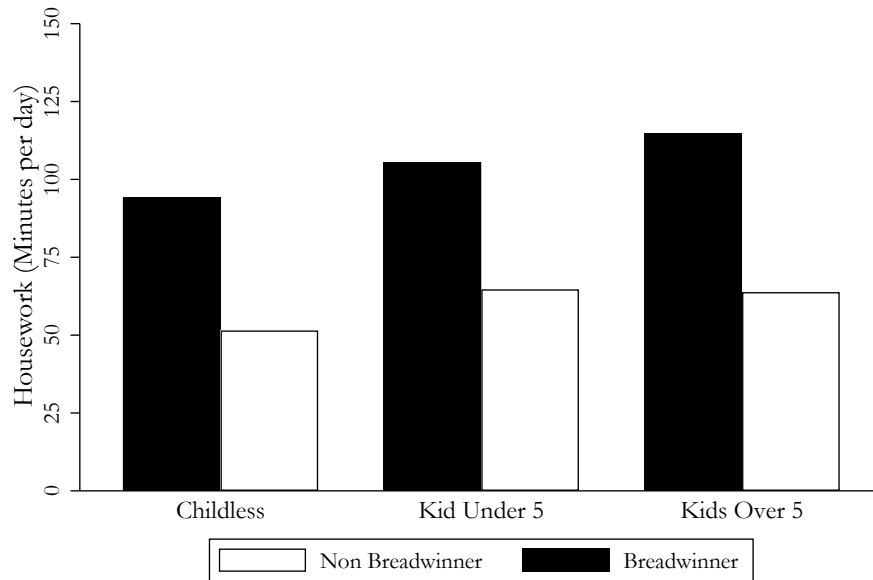
Figure 2: ATUS Housework



Notes: This figure shows mean levels of 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.

only, specifically cooking, cleaning, and interior maintenance and decoration. 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.

Figure 3: ATUS Housework By Age of Youngest Child



Notes: This figure shows mean levels of housework (defined as home production less childcare time) for heterosexual married and cohabiting couples with female breadwinners without children, with children younger than 5, 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.

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 straight couples with female breadwinners when they are 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.

Looking at the opposite angle, Appendix Figure A.4 shows that the labor supply of men also appears to be unresponsive to whether they or their (female) partner is the higher earner. The distribution of the difference between male and female hours worked looks strikingly similar between couples where the female partner earns the higher wage, and those where it is the male partner who does.

Together, these facts suggest that specialization within the household does not appear to be gender neutral.

These results are derived from cross-sectional comparisons. One could worry that there are unobservable characteristics of men and women who work more or perform more household tasks that drive their behavior and that are correlated with wage changes. To reduce these concerns, we turn to panel data that allow us to compare the behavior of an individual or couple over time. We use two panel datasets: the US Panel Survey of Income Dynamics (PSID) and the Household, Income and Labour Dynamics in Australia (HILDA), utilizing the latter when the US data do not have the variables we need.

First looking cross-sectionally, Appendix Figure A.1 in both the PSID (where we cannot identify same sex couples) and HILDA (where we can), using a weekly housework hours variable shows the same pattern of female breadwinners doing substantially more housework. We then look longitudinally, holding couples constant and looking at what happens when breadwinner status changes, allowing us to control for couple-specific unobservables. Appendix Figure A.2 shows that 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.¹

Table A.1 explores several explanations for the gap between low earning men and their spouses' housework by estimating this difference in regressions using the ATUS and PSID. All specifications include controls for number of children and quadratics in the age of both couple members. Columns (1)–(3) of Panel (A) show that the gap persists in ATUS households that are above median income, observed after 2012, and even those where only the woman works. Columns (4)–(6) present the same specifications, this time with couple fixed effects in the PSID, showing that the same

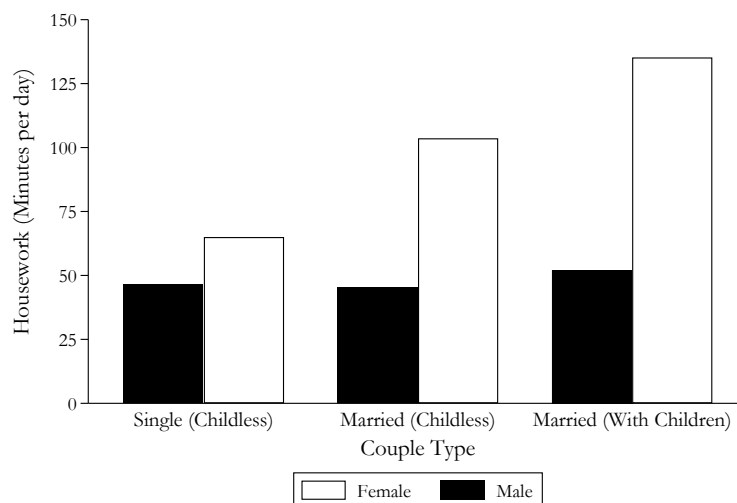
¹Housework is regressed at the individual level on indicators for female, breadwinner, and a female-breadwinner interaction term, along with couple and year fixed effects, and then predicted housework is graphed.

patterns hold true, except for households where only the woman works, where both couple members appear to perform equal amounts of housework.

We also show the gap is not due to only temporary breadwinner status for women after male job shocks, as it could be the case that not enough time passes with her as the breadwinner to reallocate housework away from her. Panel (B) of Table A.1 shows in the PSID that couples where at least 50% of the recorded years in which breadwinner status could be determined had the woman as the breadwinner, or couples where the woman was the breadwinner two years before and two years after the period of observation, do not eliminate women’s larger share of home production time.

One question is whether these disparities in home production represent preferences. Perhaps men perform home production less because they do not value it. Returning to the ATUS, Figure 4 shows, though, that while women do marginally more when single and childless than men, women’s time truly balloons when entering into marriages, *even if no children are present in the household*. We will return to these differences across marital status longitudinally in Section 4.

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



Notes: This figure compares mean levels of housework (defined as the sum of the following ATUS time-use categories: Housework; Food & Drink Preparation, Presentation, & Clean-up; Interior Maintenance, Repair & Decoration) 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.

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.

3 Model

Having demonstrated that men's time devoted to household tasks is very unresponsive to relative earnings and that this is visible in cross-sectional and panel data despite them apparently valuing those services and being able to perform them when alone, we next turn to a model that highlights which factors determine the allocation of time for men and women, both when single/divorced or when paired.

3.1 Collective Model with Differential Productivity

It has been hypothesized, in response to these documented patterns, that men and women may experience differential costs of home production. It is difficult to think that for tasks like washing dishes or doing the 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. We thus examine the predictions of an efficient, collective decision-making model with differential costs of home production by gender to see if they can match the stylized facts presented above.

In autarky, each spouse maximizes their utility in the following way:

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

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. Men could devote less time to household production because their productivity is lower, because they have higher wages, or because they care less about services and goods produced in the household.

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

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

where μ represents the Pareto weight that could depend on wages and other factors. Notice that household production is now treated as a public good and is common to both. The budget constraint for individual consumption remains the same although there can be transfers between spouses so it is the joint condition: $c^m + c^w = w^w h^w + w^m h^m$ but the time constraint for household production becomes $x = \delta(f(T - l^w - h^w) + \beta f(T - l^m - h^m))$ where $1/2 \leq \delta \leq 1$ indicates the degree of returns to scale to household production. When $\delta = 0.5$, there are not returns to scale in household production while when $\delta = 1$, the production of each household member is perfectly shared with the other.

The first order conditions then become:

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

$$\frac{\partial U^w}{\partial l^w} = \delta f'(T - l^w - h^w) \left(\frac{\partial U^w}{\partial x} + \frac{1 - \mu}{\mu} \frac{\partial U^m}{\partial x} \right) = \frac{\partial U^w}{\partial c^w} w^w$$

$$\frac{\partial U^m}{\partial l^m} = \delta \beta f'(T - l^m - h^m) \left(\frac{\mu}{1 - \mu} \frac{\partial U^w}{\partial x} + \frac{\partial U^m}{\partial x} \right) = \frac{\partial U^m}{\partial c^m} w^m$$

Combining the last two FOCs and replacing the bargaining weight for the first

FOC, we obtain

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

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

What determines the ratio of housework time is the ratio $\beta w^w/w^m$. It is thus possible that for β low enough, $\beta w^w/w^m < 1$ even if $w^w/w^m > 1$.

Prediction 2: The ratio of time devoted by spouses to household production should depend negatively on the wage ratio, even if women have a comparative advantage in terms of productivity. Ratio of time in leisure should be independent of housework productivity.

From the above condition, we observe that the ratio of time devoted to household work only depends on $\beta w^w/w^m$. This implies that preferences for household production or bargaining power should be irrelevant in determining the share of household tasks performed by each partner. This argument is akin to that of Udry (1996) for agricultural production. Efficient households should devote the time of the most productive partner to obtain the household production at the least cost. They should then compensate that household member through transfers in terms of consumption.

Women may use a higher fraction of their time in household production than men because they are more productive unless their higher wage compensates for this effect. For example, if a woman earns twice as much as her husband, only if she is twice as productive in housework ($\beta < 1/2$) should she perform more tasks. While a larger productivity gap would moderate the impact of the wage ratio on the time allocated to housework, there should still be a negative relationship.

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:

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

Thus, the partner that has more bargaining power should be able to enjoy more leisure and leisure should also be dependent on the ratio of wages. We should thus observe that individuals spend more time in the workforce and less time in leisure

when they are the partner with the higher wage. However, β plays no role in this ratio. Individuals who are more productive in housework work less in the labor market but do not receive more leisure.

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

The marginal cost of devoting more time to household tasks is the same in marriage and in singlehood. The marginal return differs because of δ and the fact that partners can enjoy the x produced by their spouse, which lowers the marginal utility of x .

It is possible that one of the partner could do more in marriage than when each of them live separately but the “cost” of housework should not increase. This is because the solution to the single’s problem can also be found from a maximization of a weighted sum of their utility but subject to the fact that each partner cannot share x nor make transfers of consumption or leisure time. Let us denote as x^{m*} and x^{w*} as the preferred elections when single. Given the condition of efficient allocation of tasks to each spouse when forming a household, we know that the cost of producing this combination of x will fall (if there are returns to scale in the household) or at least stay the same. This will be akin to an increase in income from the single to the married state for the household. If c and l are both normal goods, this increase in income should be used to increase the consumption of all three goods, and it would thus be impossible that the increase in x would lead to an increase in the cost of producing it, since this would imply that either consumption or leisure would fall. Thus, if the household acts efficiently, it would not lead to the household using more time in household production than when single, although it would lead to reallocation

of household time from the spouse whose cost is higher or efficiency lower to the one who has a lower wage or is more efficient. This spouse would then work less on the labor market to maintain their benefit in terms of leisure.

In order to obtain a tractable version of the model, we specify a type of utility functions (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 amount of leisure.

4 Empirical Evidence

An efficient household model with comparative advantage can explain some of the empirical facts we documented. 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. We now turn to examining the model’s remaining predictions in the data.

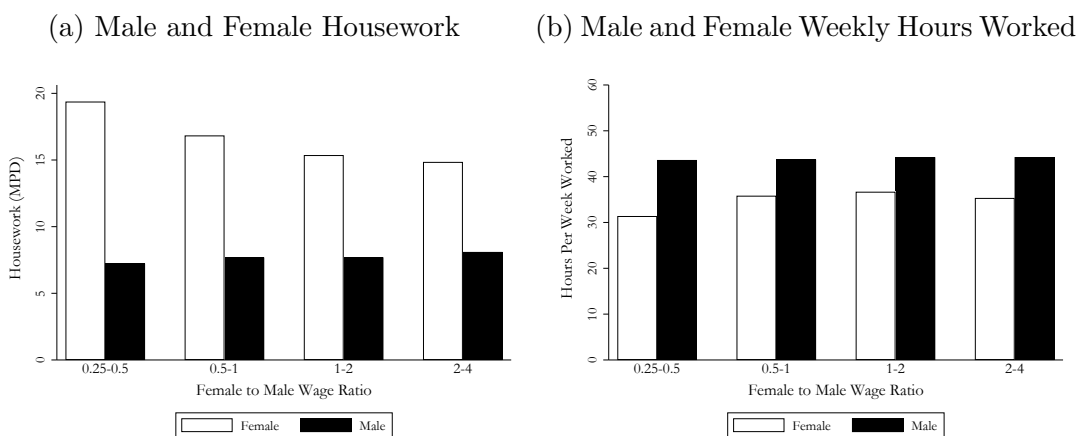
4.1 Time Allocation and the Wage Ratio

Prediction two 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, not just the home production productivity differential. To examine this, we look at couples with varying wage ratios.

Using the PSID, we use the hourly wage to group households into those where women earn a quarter to a half of their husband’s wage to those where women earn twice to four times their husband’s wage, from left to right in Figure 5. 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 they 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.

Figure 5: Dual Earners Housework and Market Work Hours By Wage Ratio



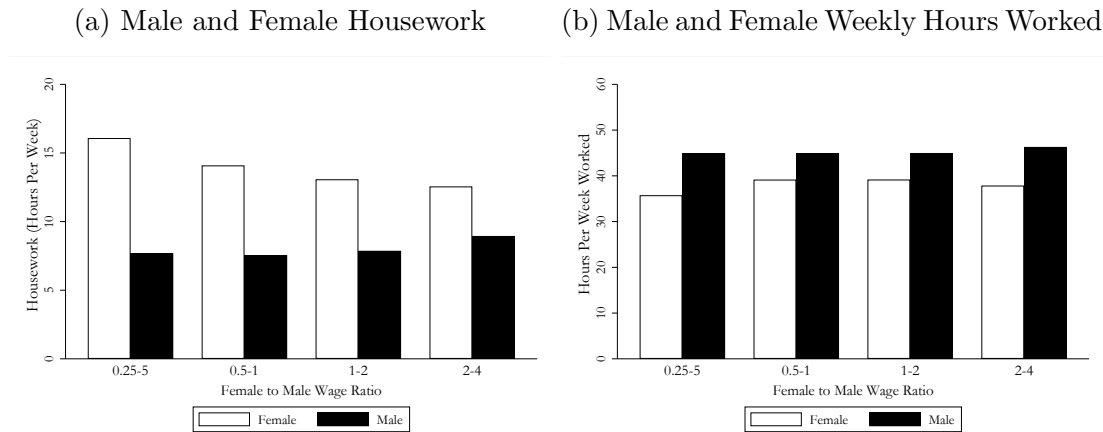
Notes: Panel (a) shows mean levels of housework (hours per week) for women and men in dual earning couples grouped by the ratio of female to male wage. Panel (b) plots the average weekly hours worked per week in all jobs for men and women, again grouped by female to male wage ratio. Wages are calculated as gross financial year labor income divided by annual hours worked in all jobs. 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 1985-1996 and odd years between 2001-2019 from the Panel Study of Income Dynamics.

Notice that in Panel (b) of Figure 5, men’s weekly hours worked in the labor market appear fixed slightly above 40 hours per week. One potential explanation is men or the occupations in which they are more frequently employed face larger frictions in setting working hours than women. To test this explanation of the results, we repeat the exercise in Figure 6, this time restricting to couples where both men and women work in services, sales and office support, or transportation occupations, which empirically exhibit the highest levels of part-time work for men. 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.

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.

Figure 6: Dual Earners Housework and Market Work Hours By Wage Ratio, Flexible Occupations



Notes: This figure replicates Figure 5, further restricting to couples where both individuals are employed in services, sales and office support, or transportation occupations.

4.2 Marriage and Divorce

We next turn to examining the model’s predictions, 3 and 4, 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

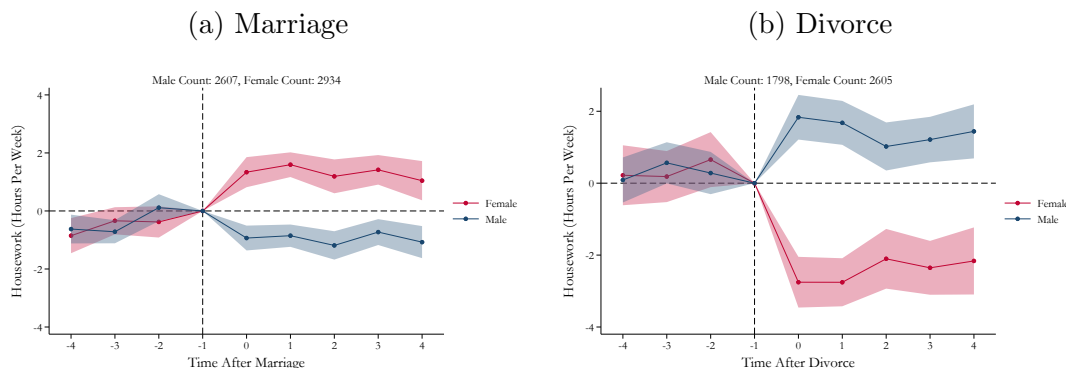
factors like number of children, we perform event studies around marriage and divorce in the PSID, tracking how entering and leaving the marriage “trade union” affects housework time.

Figure 7 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.² Confirming the cross-sectional evidence, women’s housework time goes up substantially upon marriage, showing that specialization appears to dominate returns to scale. In the longitudinal data, when controlling for children and looking at the time period close to marriage, we actually see that men’s housework time goes down, as he benefits from being able to “purchase” housework time instead. These findings are perhaps unsurprising in a comparative advantage model. What is more surprising is that in panel (b) we see that women’s housework time goes down upon divorce, and men’s up. 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 after these children to only one. The data appear to point toward her not performing these tasks primarily for her children, but to her male partner actually creating a lot of the household demand for these tasks.

Men’s time going up following marriage 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 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.

²We show these same series in the HILDA in Appendix Figure A.10. 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 7: PSID Marriage and Divorce Events: Housework



Notes: Plot of 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, 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. 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. Data are from all years between 1985-1999 and the odd years between 2001-2019 of the Panel Study of Income Dynamics.

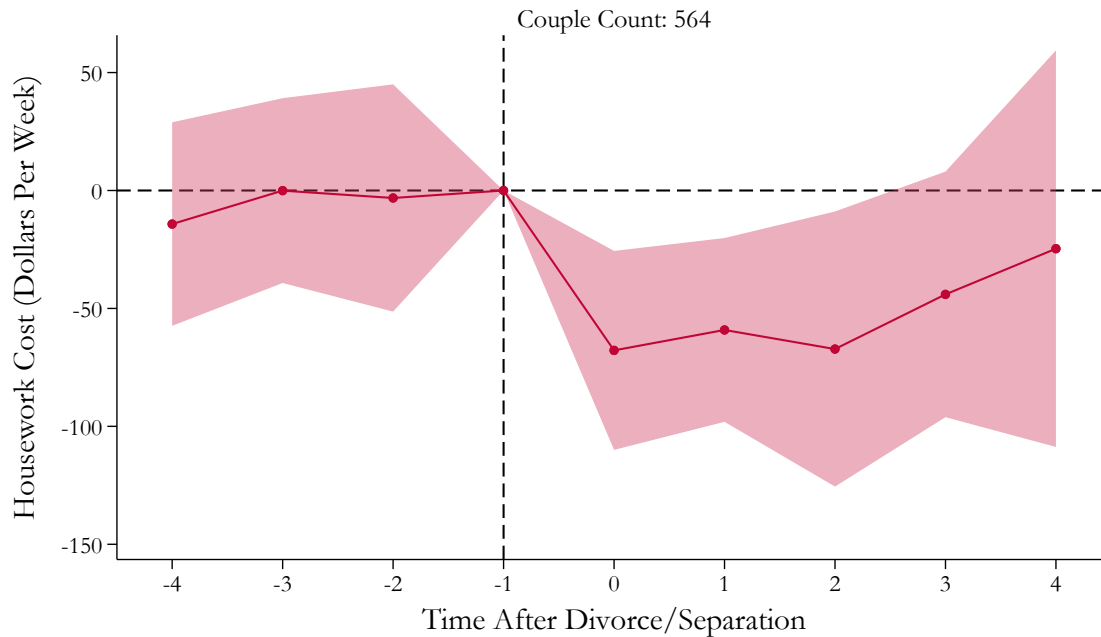
Appendix Figure A.11 shows using data from the HILDA that, upon divorce, men’s expenditure on meals outside of the home increases significantly, whereas women’s is unchanged. This demonstrates that men switch from “purchasing” goods within the household to explicitly purchasing them on the market, again suggesting male demand for these types of goods.

While these figures are surprising if one believes households primarily provide returns to scale in home production, they 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 returns to scale are not too large. We next turn to examining prediction 4, that households should never pay more for home production in marriage than in singlehood or divorce.

Figure 7 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, where they could benefit from returns to scale, than when divorced, when they cannot. With returns to scale, married households could 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, 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—in making the home produced good.

Figure 8: Housework Cost after Divorce



Notes: Plot of event study estimates of the effect of divorce in the PSID on the cost of weekly hours 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 the 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 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. 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 weighting the hours spent on housework in marriage and then divorce by each individual’s wage, treating it as the shadow cost of time, to see if households’ total costs of housework production go up

or down upon divorce. In Figure 8, we perform event studies for this total housework cost, following both individuals in a couple after they divorce.³ Surprisingly, we find that total costs are lower upon divorce, something impossible in our model, which suggests that the time allocation within marriage may have been skewed further than was justified by comparative advantage.

Having shown that the data presents some challenges to an efficient comparative advantage model, we next examine in which ways household’s adjustments fail to match the theory’s predictions.

4.3 Examining Frictions in Time Reallocation

In Figure 9 we use very fine bins of relative earnings—dividing 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.

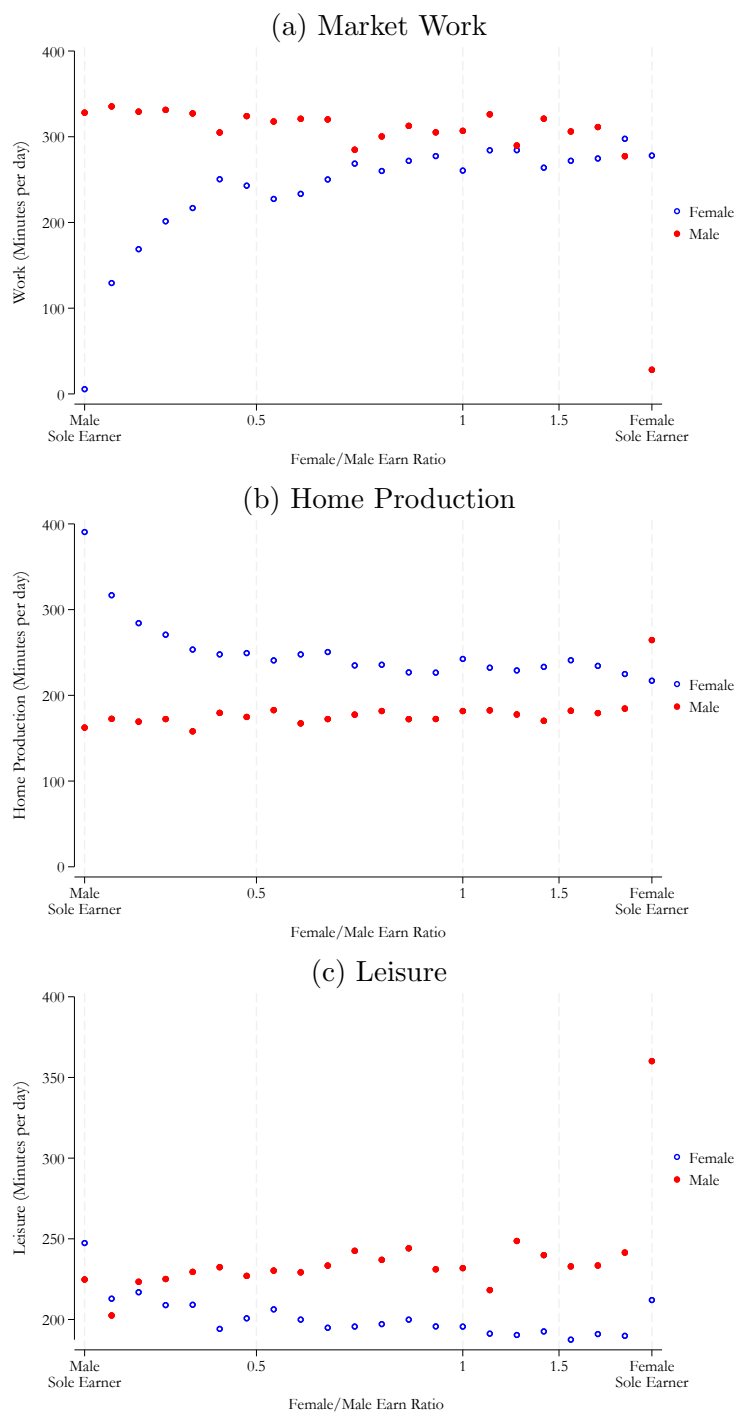
Indeed, while women’s time in household tasks exhibits a curve toward “home-maker” as her earnings decrease, men barely increase their housework time throughout the different earnings permutations.

At the point where men earn zero, where we have a female sole earner, we do see some change in men’s home production, with it being higher than women’s for the first time. But, the size of this increase is dwarfed by the amount of housework time women do when men are sole earners (or gay men, as shown in Appendix Figure A.7). This lack of 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 compar-

³Wages 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.

Figure 9: Time Allocations by Gender Earnings Ratio



Notes: Panel (a) shows mean levels of market work (in minutes per day) for women and men in dual earning couples grouped by 20 quantiles of the ratio of female to male weekly earnings. Panel (b) plots the average levels of home production, again grouped by female to male earnings ratio. Panel (c) plots average levels of Socializing, Relaxing, and Leisure. 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.

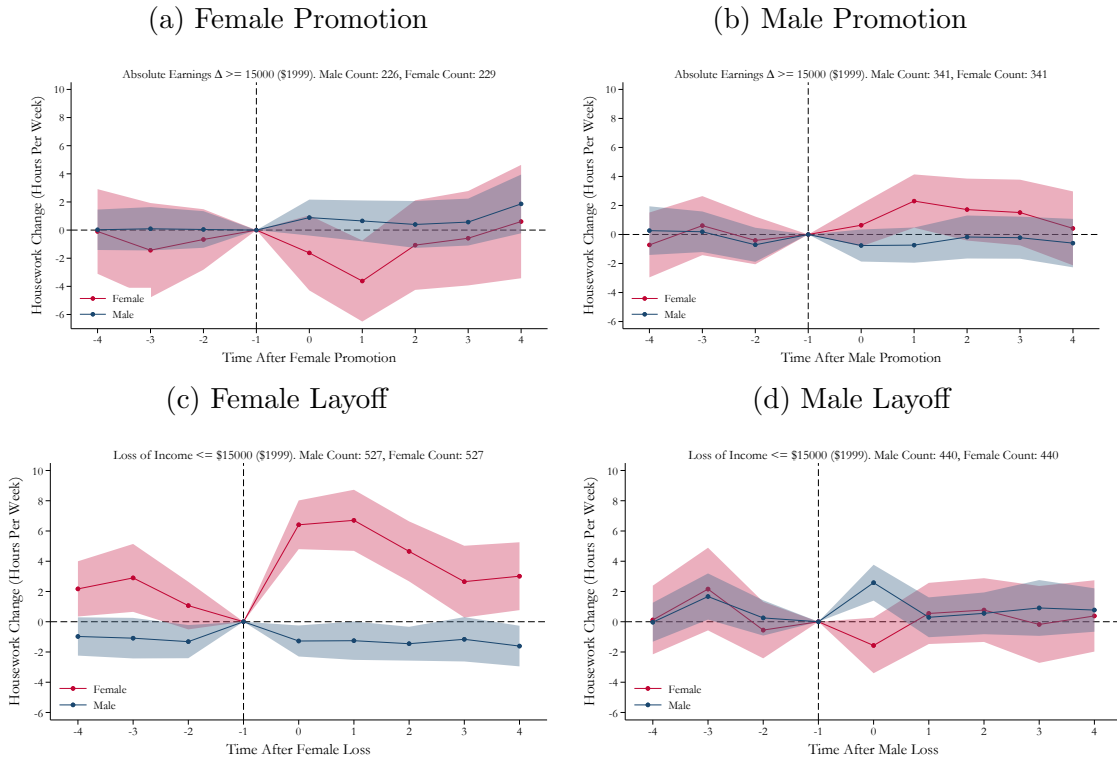
ative advantage model: when women are sole earners, men have an enormous amount of leisure time. This cannot be explained by an efficient model, where his low shadow cost of time should dictate that he puts time into home production, however low his productivity may be.

Examining this longitudinally, we find that both men and women have a tendency to under-adjust to relative earnings changes that are not accompanied by forced hours changes via job separation. However, only men fail to adjust home production time in response to losing employment. Figure 10, panel (a), shows that when men and women experience large promotions ($> \$15,000$ 1999 USD), housework time allocation changes very little, in either case. But when men and women are involuntarily separated from their jobs, in panel (b) the reaction is different by gender. The job loss events are restricted to jobs earning less than $\$15,000$, so the impact on household earnings is the same as the promotions. We observe that the men's housework rises in the period after they are laid off, and quickly falls to pre-layoff levels, whereas women who are laid off exhibit a much larger and persistent increase in their housework.

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. Perhaps it is experienced as costly for men to perform these tasks, rather than actually being costly in terms of time spent.

In line with possible identity explanations, Appendix Table A.2 investigates 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, 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.

Figure 10: Housework Adjustment to Unemployment after Job Loss & Promotion Events



Plot of event study estimates of the effect of female (Panel (a)) and male (Panel (b)) layoffs, defined as losing a job that paid at most \$15,000 (in 1999 dollars) due to being laid off or having the employer go out of business, and female (Panel (c)) and male (Panel (d)) promotions, defined as entering a new position at unchanged employer since the last year with an increase in income of at least \$15,000 (in 1999 dollars), on reported weekly hours of housework performed by men and women relative to the period before the event ($t=-1$). Regressions include year fixed effects, dummies for number of children present, and quadratics in both members' ages. 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. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics.

4.4 Comparison to Same Sex Couples and Counterfactual Analysis

We now return to comparing heterosexual couples to same sex couples, where gender identity may play less of a role. Because earnings are clearly endogenous to time investments, we want to compare how couples specialize in home production tasks based on their *ex ante* earning capacity. To do this, we first predict wages exploiting information regarding education, gender, state of residence and year of the

survey only. The idea would be that this reflects some relative earning power within the couple prior to specialization decisions. We then, for married individuals, regress time in home production and housework on their expected percent of the household wage, controlling for household average wage (since households where women earn more also tend to be poorer), in both same and opposite sex couples.

Table 1: Home Production by Predicted Wages, by Couple Type and Gender

	Time spent on...							
	<i>All Home Production</i>				<i>“Housework”: Cooking and Cleaning</i>			
	Straight		Same Sex		Straight		Same Sex	
	Male	Female	Male	Female	Male	Female	Male	Female
Pred. % HH Wage	-47.74*** (10.04)	-136.06*** (10.51)	-169.17** (85.88)	-8.69 (89.22)	-1.87*** (0.64)	-17.21*** (1.09)	-15.78* (8.05)	-6.84 (7.22)
Avg. HH Wage	0.09 (0.11)	-1.19*** (0.11)	0.13 (1.32)	0.81 (1.05)	0.06*** (0.01)	-0.21*** (0.01)	-0.12 (0.13)	-0.02 (0.08)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Sample of same-sex and opposite-sex couples from ATUS and HILDA. Individuals are between the ages of 20 and 55. All errors clustered at the household level. All regressions include fixed effects for country, and year and controls for age, quadratic age, and children in the household.

Table 1 shows something stark: While men are much less responsive to predicted wage in both total home production or housework time than women in heterosexual relationships, men in same sex relationships are *more* responsive to this metric than women in same sex relationships. In other words, the fact that there are two opposite sex people in a relationship appears to play a role: the allocation of household tasks is not gender neutral in heterosexual couples.

To demonstrate that this is due to responsiveness to underlying characteristics, rather than to underlying characteristics themselves, we perform a counterfactual analysis, holding characteristics of individuals in each couple type fixed, but using the predicted responsiveness to these factors from individuals of the opposite gender or individuals in same sex relationships, in Table 2.

Table 2: Counterfactual Hours Worked and Housework Time

	(1)	(2)
	Straight Male	Straight Female
<i>Hours Worked per Week</i>	37.6	26.8
...Pred. if were opposite gender	→28.5	→36.3
...Pred. if were in same-sex rel.	→37.7	→33.8
<i>“Housework”: Cooking and Cleaning</i>	5.1	13.1
...Pred. if were opposite gender	→12.6	→4.9
...Pred. if were in same-sex rel.	→8.3	→8.1
Observations	52,400	62,614

Note: Sample of men and women between the ages of 25 and 55 from ATUS. Counterfactual estimates are produced through three steps:

- (1) We perform two 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 statistical area) 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.

We see that in general, 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. Both gaps would shrink if straight women were to behave like lesbians. This suggests that the problem is not that men and women differ in their observables, but rather that there are differences in the way heterosexual men and women respond to their earnings potential.

Moreover, it is suggestive of an identity channel to the inefficiencies we have documented: men of all types demonstrate “over-attachment” to the labor force despite lower earning power, but only *straight* men fail to pick up home production tasks as earnings decline.

5 Inefficient Theoretical Framework and Implications for Marriage

Having shown that a simple model of comparative advantage fails to explain the deep lack of responsiveness of intra-household time allocation to relative wages, we now incorporate a gendered friction in the efficient allocation of home production into our model, and explore the implications of such a model for household formation.

5.1 Gendered Inefficiency in Home Production Allocation

Replicating the empirical facts regarding households' lack of responsiveness to relative wages requires a model with some inefficiency. In particular, it requires that gender roles are more active in marriage than in either singlehood or divorce. Those could take many different forms. To avoid adopting a particular version, we will simply assume that there will be additional benefits for women to devote time to household tasks and that men will want to under-invest in those same tasks when in a relationship. Alternatives 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.

In that case, the decisions of households in the second period will change from the results above and we will now face:

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

$$\frac{\partial U^w}{\partial l^w} = \delta f'(T - l^w - h^w) \left(\frac{\partial U^w}{\partial x} + \frac{1 - \mu}{\mu} \frac{\partial U^m}{\partial x} \right) + \gamma = \frac{\partial U^w}{\partial c^w} w^w$$

$$\frac{\partial U^m}{\partial l^m} = \delta \beta f'(T - l^m - h^m) \left(\frac{\mu}{1 - \mu} \frac{\partial U^w}{\partial x} + \frac{\partial U^m}{\partial x} \right) - \gamma = \frac{\partial U^m}{\partial c^m} w^m$$

where $\gamma > 0$ represents an additional benefit (cost) of household production for women (men).

In words, this means that consumption shares continue to reflect the relative bargaining power of each spouse, but investing in home production now has an additional return for women while there is an additional benefit to working for men.

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. Leisure, on the other hand, could now fall upon forming a household.

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 an inefficient model.

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.

Compared to the previous model, we will now have that household task allocation may depend on bargaining weights, on discount factors and even on how different the continuation value for a couple is to remain married versus single. We should particularly see an over-investment in households tasks by women (and by the household overall) in relationships where δ is large which could be linked to stronger gender norms or other factors.

5.2 Implications for household formation

If individuals in the economy anticipate how household tasks will be divided if they form a household, it could affect the attractiveness of some unions versus others. The following propositions detail this.

Prediction 6: Even with efficient allocation, surplus from marriage will be higher for couples where the wife earns less than the husband when β is low.

By the envelope theorem, in the efficient model, 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 less if the opposite. Specialization has benefits here and so making the partner who works more hours earn a 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 as in singlehood, 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 an inefficient household

Prediction 7: Surplus from marriage will be higher for couples where the wife earns less than the husband when there is gendered inefficiency.

Under our model of gendered inefficiency, women will perform more household tasks than is efficient because it gives them utility while men benefit from working more than what would be efficient. This is not 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.

6 Implications for Marriage: Ethnic Outmarriage

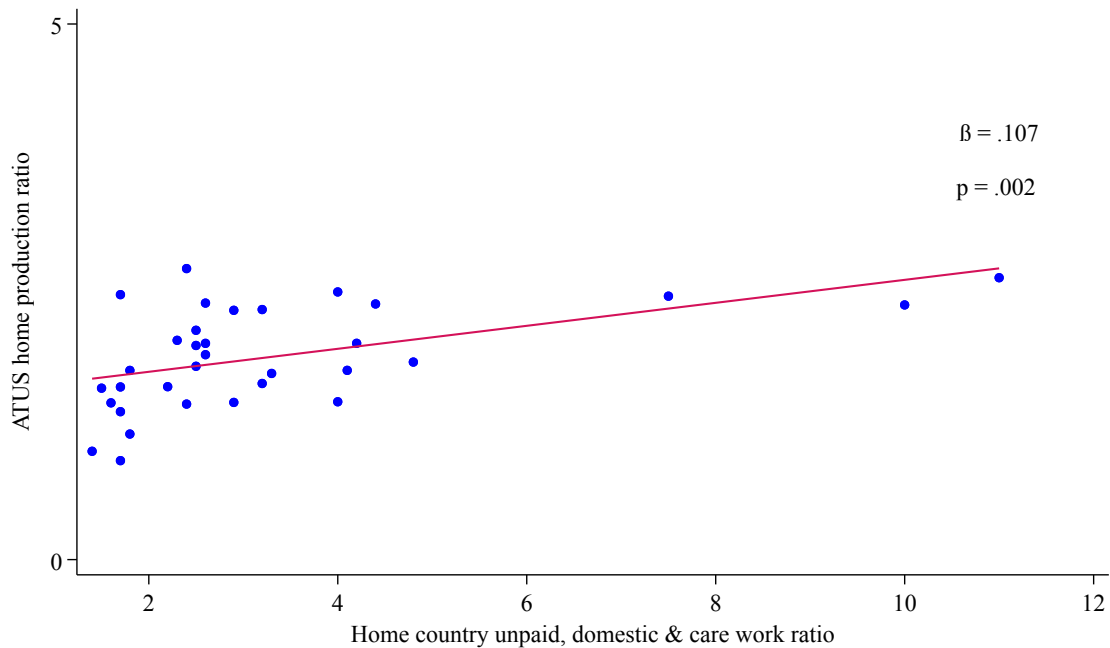
Our model predicts that when there is a productivity advantage for women in home production or there is gendered inefficiency in the allocation of household tasks, unions involving a woman that out-earns her spouse will be less attractive. There is already ample empirical evidence that relative earning can affect marriage rates, for which our model and empirical evidence provides a new micro-foundation. We now provide the first direct empirical test for the fact that men do not take over more household chores when they earn less (either because they have low productivity or because of other inefficiencies) is part of the reasons for this.

To do this, we measure how couples respond to relative earnings depending on how socially acceptable it is in their ethnic group for men to take on more household tasks when their income is lower than women's.

We exploit variation across ethnic groups for this objective. Given that differences

across immigrants in their allocation of housework could be due to situations that some groups faced in the US that would be endogenous, we instead employ variation by country of origin. 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.⁴ To use this as valid variation across ethnic group, we first demonstrate that immigrants to a degree replicate the behavior of their home country.

Figure 11: Home Production Ratios among Immigrants Compared to Home Country: ATUS and OECD GID-DB



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 20 and 55 and immigrated to the US when they were 21 or younger. Data for (a) come from the American Time Use Survey from 2003-2022 (excluding 2020), 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 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.

To show that there is some validity in this measure, we correlate the OECD

⁴These 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.

measure with the average female-to-male ratio of time in home production among a sample of immigrants from the American Community Survey (ACS), 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. This suggests that cultural norms perdure upon arrival to the United States and may be used as a valid source of “exogenous” variation in costs for men to perform housework.

However, our framework states that gendered inefficiency in allocation or in culturally acquired productivity differences will decrease the value of marriage when combined with higher labor productivity by women than by men. It thus becomes costly in terms of marital surplus when women are more likely to out-earn their spouses, because specialization along gender, rather than earnings, lines will be more costly. We thus use variation across location (by metropolitan statistical area) and ethnic groups in the relative incomes of men and women in those cells as a source of variation. Our model provides a prediction on the interaction of these two elements: women facing unfavorable earning ratios combined with unfavorable home production ratios would be more likely to forego marrying within ethnic group. We consider that marrying within one’s ethnic group is preferred and thus observing that women are less likely to do so would be a demonstration that the surplus from marriage is lower.

Specifically, we will estimate how the probability that an individual i of ancestry a ⁵ living in metropolitan area c in year t married an individual out of their ethnic group or never married (y_{iact}) correlates with our variable of interest using the following equation:

$$y_{iact} = \alpha + \beta \text{Income ratio}_{act-10} + \delta \text{Income ratio}_{act-10} * \text{HP ratio}_a + \mu_a + \nu_t + \varepsilon_{iact}$$

where the income ratio is the female-to-male average income ratio of men and women of the same ethnic group, living in the same metropolitan areas, of the same age as the group under study but 10 years prior to capture the perceived gender ratio at the moment of making marriage decisions. This decade lag allows for a sufficient period of

⁵In Figure 11, ethnicity was defined by reported birthplace, as ATUS does not contain ancestry data. The birthplace measure is reported more crudely than the ACS ancestry variable and for many respondents indicates larger geographic areas (e.g., “Central America” or “Other USSR/Russia”); therefore, when analyzing ACS data, we transition to using the ancestry variable as the ethnicity marker.

information acquisition and expectation formation prior to making marital decisions. When they enter their marriage market, then, they have established beliefs about the characteristics of unions available to them. We then interact this local marriage market variation with ethnic-level variation identifying how difficult it may be for lower earning men to undertake housework. Finally, we also include other types of controls at the marriage market level.

Results presented in Table 3 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. This result is very relevant in terms of magnitude and also statistically significant. This trend remains true if we assess all women in their choice to marry or remain single, as shown in columns (1)–(3), and if we assess women in their choice to out-marry conditional on being married, as shown in columns (4)–(6).

The literature postulates that men prefer to marry women that earn less than them; the effect of this preference, which could be greater in countries with worse home production time ratios, is potentially correlated with the decision of women to not marry men who both earn less and spend less time in home production. Therefore, we include a measure of attitudes towards women’s income to control for undesirability of women out-earning men from the opposite side of the marriage market. 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.” Contrary to the hypothesis where our HP ratio would simply capture machist attitudes, we see that the interaction with gender attitudes is not significant either when included separately or jointly with our measure of housework ratio. This suggests that the reason why women from ethnic groups that distribute tasks more unevenly at home choose not to marry someone from their ethnic group when they are more likely to out-earn them is not linked to generic gender attitudes but to something related with allocation of tasks at home. Coefficients are normalized such that the difference in magnitude also is meaningful indicating that it is not a lack of precision that makes gender attitude having no impact in the estimated relationship.

These results are compatible 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.

Table 3: 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 \times HP ratio	0.171*** (0.045)		0.160*** (0.045)	0.208*** (0.074)		0.203*** (0.076)
Income ratio \times Gender attitudes		0.043 (0.033)	0.048 (0.029)		0.034 (0.044)	0.002 (0.049)
Income ratio	0.014* (0.007)	0.006 (0.015)	0.028** (0.012)	0.030** (0.015)	0.015 (0.022)	0.029 (0.020)
Constant	3.860*** (0.538)	3.971*** (0.502)	3.783*** (0.555)	-0.235 (0.652)	-0.163 (0.622)	-0.360 (0.663)
R ²	0.171	0.179	0.174	0.170	0.172	0.169
Observations	7753	8629	7472	4743	5110	4586

Notes: This table includes OLS regression results for the relationship between ethnic out-marriage or singlehood outside the respondent's reported country of ancestry; the female-to-male income ratio; and time spent in unpaid, domestic, and care work in immigrants' countries of ancestry. The ancestry variable is defined among immigrants listing a primary ancestry; individuals listing multiple ancestries are excluded from the sample to more cleanly identify the influence of ethnicity on the outcome of intermarriage. Sample of ACS data 2021 - 2022 of immigrant women at and ten years above the median age of marriage who immigrated under the age of 21. In ACS 2021, the median marriage age for women is 25; in 2022, it is 25. Income ratios are computed among men and women aged between the 25th percentile and 75th percentile of marriage age one decade prior to the primary sample. In ACS 2011, the 25th percentile is 20 and the 75th percentile is 28; in 2012, they are 20 and 28, respectively. Columns 1 and 4 include the HP ratio interaction alone; columns 2 and 5 include the attitude interaction alone; columns 3 and 6 include both the HP ratio interaction and attitude interaction. The HP ratio and attitude variables are taken from the Gender, Institutions and Development Database (GID-DB) 2023 from the OECD Development Centre. HP ratio is the female-to-male ratio of time spent on unpaid, domestic, and care work in a 24 hour period. Controls include age; age²; age at immigration; total income; and dummies for education, country of origin, sample year, and MSA. Standard errors are clustered at the marriage market (year \times ancestry \times MSA) level. Marriage markets are excluded from analysis if they contain less than ten men or less than ten women between the 25th and 75th percentiles of marriage age for the income ratio computation, or if they contain less than ten women between the ages of 25 and 35 in 2021 or 2022.

7 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 does not appear to be driven by anticipating the arrival of children, nor do preference seem to be the main driver, 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 home production and labor supply should be responsive to wage ratios, even with differential productivity.

By contrast, we show that men’s work hours and housework hours are not responsive to the household wage ratio, or the shadow cost of time. Men’s housework time scarcely increases, and his hours worked change only insignificantly, as households go from men out-earning their partners by more than double to women out-earning instead. Women’s housework hours do decline a bit with her relative wage (likely due to outsourcing), but her work hours do not increase concordantly.

Analogously to a trade model, but with returns to scale, our model predicts that women may increase their home production time upon entering into a cohabiting relationship, due to specialization. Upon divorce, women’s time should only decrease if specialization dominates returns to scale. We show that women’s time goes down upon divorce while men’s increases, further challenging that preferences are the major driver of women’s high time allocation to home production. These findings are also surprising when one considers that women are more often the custodial parent following divorce.

More starkly, we find that when you multiply housework time by its shadow cost, the wage, the total cost to the household is higher in marriage than it is in divorce, which is impossible in the efficient collective model, since couples should be able to take advantage of trade to lower their costs.

This suggests a model where something more than skill—however deeply gendered—

is at play, and we provide suggestive evidence of one possible channel, within-marriage gender identity, by comparing heterosexual couples' behavior to that of same sex couples.

Together, our model and empirical evidence suggests that marriages where women out-earn men will not just be stigmatized, they will actually be less efficient, since the gendered nature of housework makes specialization less valuable when the female partner earns more money, since 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 home country. 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—consider that at any percentile in the earnings distribution where earnings are positive, white men out-earn white women, but one must go to the 87th percentile of the Black earnings distribution for Black men to out-earn Black women.⁶ Given that women considering these marriages have reason to doubt that “reverse specialization” will occur, marriage will be a lower surplus proposition than in an environment where either men earn more or they are more willing to do home production. Thus, the next frontier of gender equality may be teaching men, from a young age, to “lean in” at home.

⁶Data from the 2019 ACS.

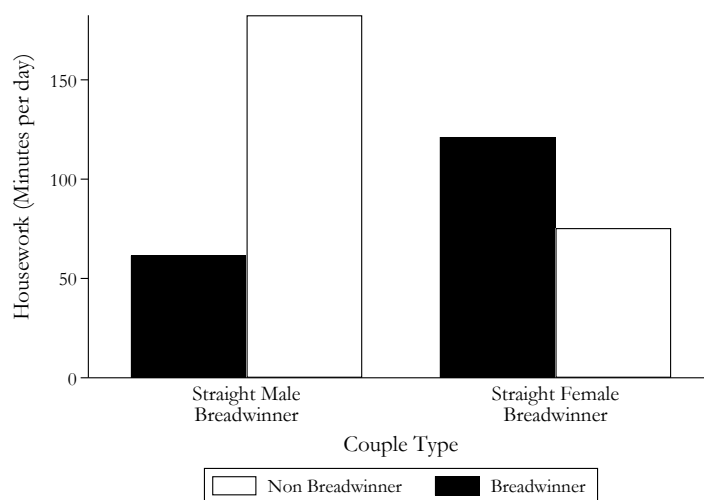
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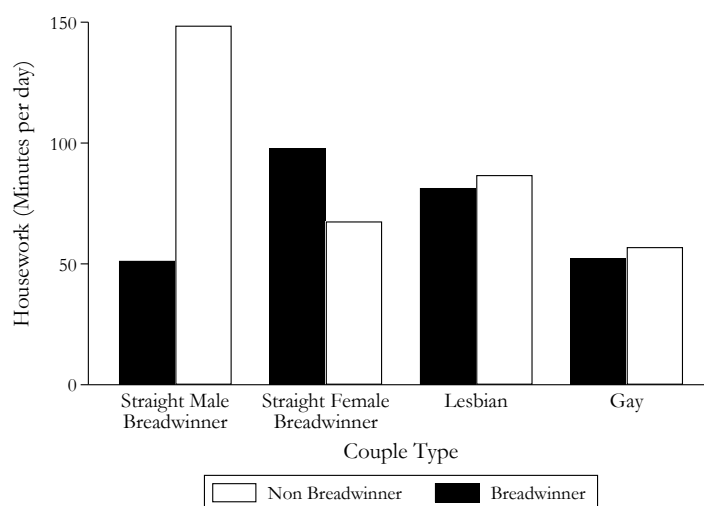
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A Appendix Figures

Figure A.1: Housework by Couple Type: PSID and HILDA



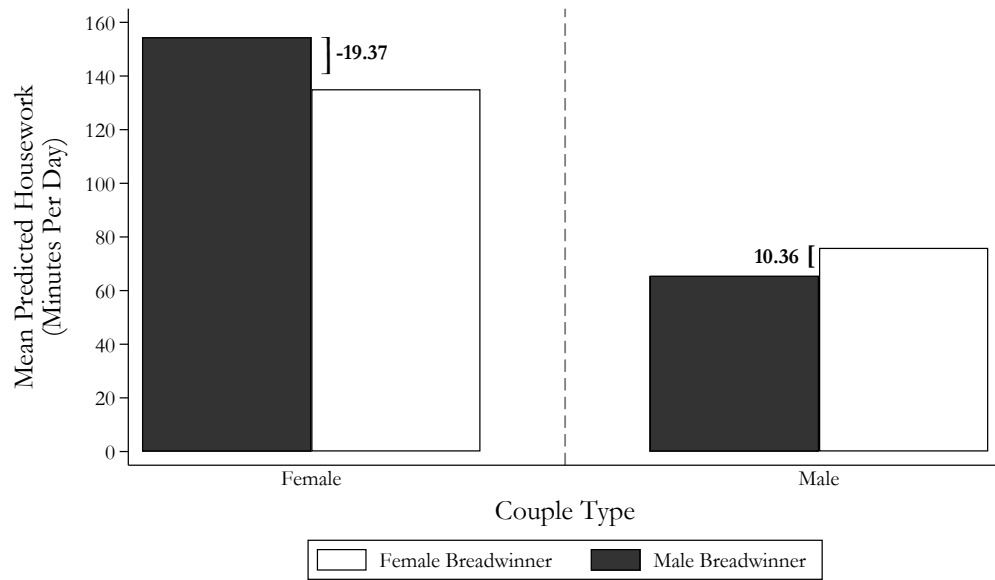
(a) PSID



(b) HILDA

Notes: Panel (a) 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. Data are 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. Data are 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.2: PSID Housework Around Female Breadwinner Change



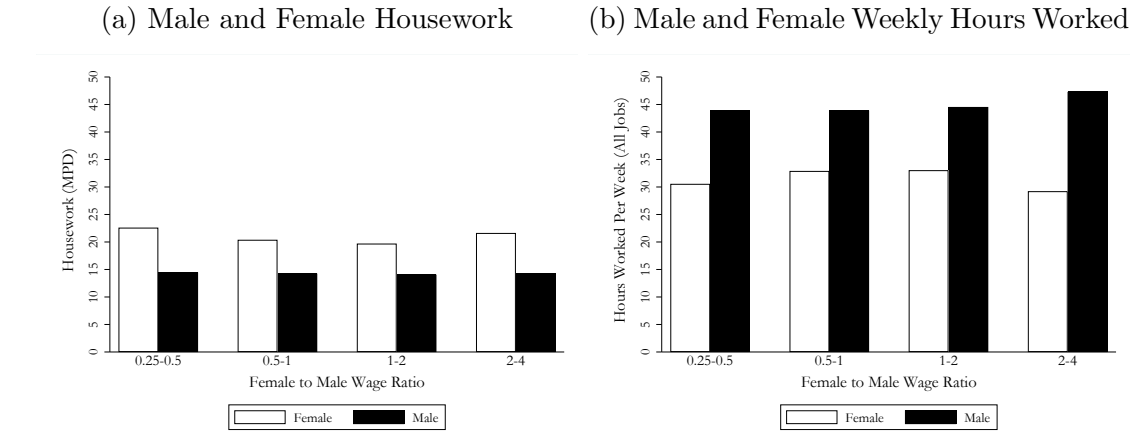
Notes: This figure plots means of predicted housework for men and women in PSID couples that experienced a change from male breadwinner to female breadwinner. Housework is regressed at the individual level on indicators for female, breadwinner, and a female-breadwinner interaction term, along with couple and year fixed effects. Predicted housework values are averaged and plotted 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

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

<i>Panel A: Housework (minutes per day) — PSID & ATUS Female Breadwinners</i>						
	ATUS			PSID		
	(1)	(2)	(3)	(4)	(5)	(6)
Straight Male Low Earner	-47.91*** (2.569)	-50.37*** (1.752)	-49.79*** (2.071)	-25.75*** (2.805)	-30.71*** (1.787)	-26.91*** (2.412)
× Above Med. Fam. Income	7.442** (3.208)			1.549 (3.373)		
× Female Sole Earner		19.99*** (3.787)			30.44*** (6.119)	
× Post 2012			12.92*** (3.080)			4.737 (3.072)
Observations	18754	19836	19836	9883	9556	9883
Couple Fixed Effects	N	N	N	Y	Y	Y
<i>Panel B: Housework (minutes per day) — PSID Restricted Female Breadwinners</i>						
	50% Recoverable Tenure			± 2 Year Tenure		
	(1)	(2)	(3)	(4)	(5)	(6)
Straight Male Low Earner	-20.60*** (4.204)	-27.64*** (2.084)	-23.47*** (2.946)	-15.36** (6.183)	-24.30*** (3.117)	-16.30*** (4.159)
× Above Med. Fam. Income	-1.281 (4.856)			-2.418 (6.679)		
× Female Sole Earner		31.08*** (7.606)			46.48*** (11.95)	
× Post 2012			2.942 (3.560)			-1.848 (5.034)
Observations	5951	7171	7415	3049	2987	3049
Couple Fixed Effects	Y	Y	Y	N	N	N

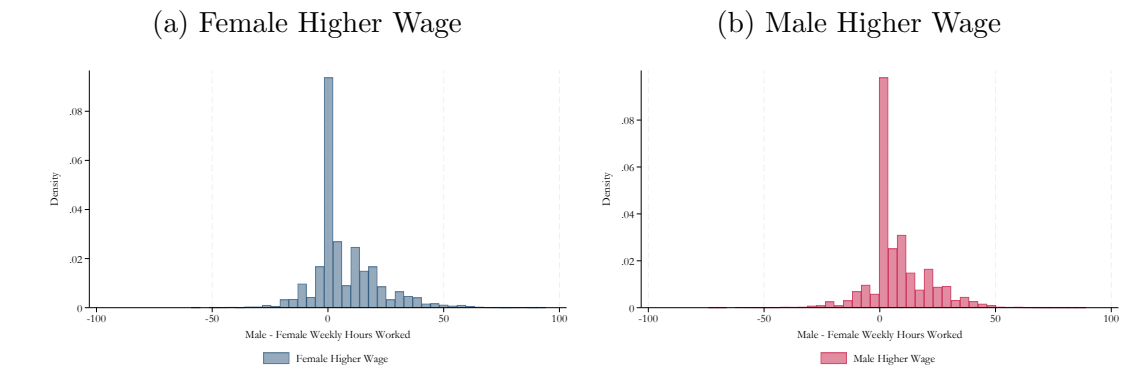
Notes: In Panel A, Columns (1) - (3) are ATUS from 2003 – 2020. Controls include dummies for day of the week and whether the survey was completed on a holiday. Columns (4) - (6) are PSID from 1985 – 2019 and include couple fixed effects. Controls include number of children, respondent age, the square of respondent age, spouse age, and the square of spouse age. In Panel B, all columns use data from the PSID from 1985 – 2019. The samples in columns (1) – (3) include female breadwinners for whom at least 50% of their tenure as breadwinner is recoverable. The sample in columns (4) – (6) 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.

Figure A.3: Dual Earners Housework and Market Work Hours By Wage Ratio, HILDA



Notes: Panel (a) 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. 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 waves 1 through 20 from the Household, Income, and Labor Dynamics in Australia survey.

Figure A.4: Within Couple Difference in Hours Worked Distribution (Dual Earners)—ATUS



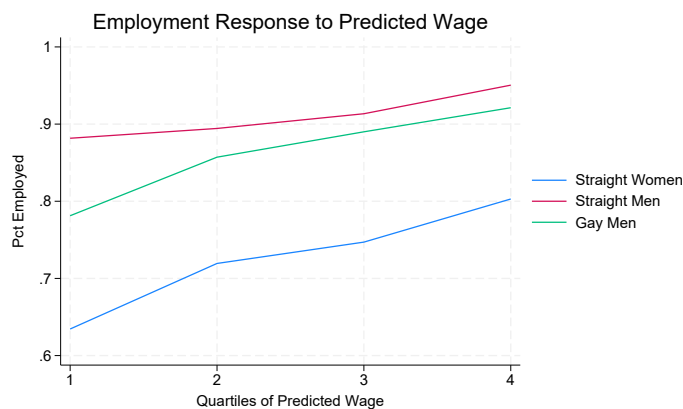
Notes: The distribution of within-couple male less female weekly hours worked for couples where both members are employed. Panel (a) shows data from couples where women have the higher wage. Panel (b) shows data from couples where men have higher wages. Wages are calculated as reported weekly earnings divided by reported average weekly hours worked in all jobs. 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 all years between 2003-2019 and odd years between 2001-2019 from the American Time Use Survey.

Figure A.5: Within Couple Difference in Hours Worked Distribution (Dual Earners)—HILDA



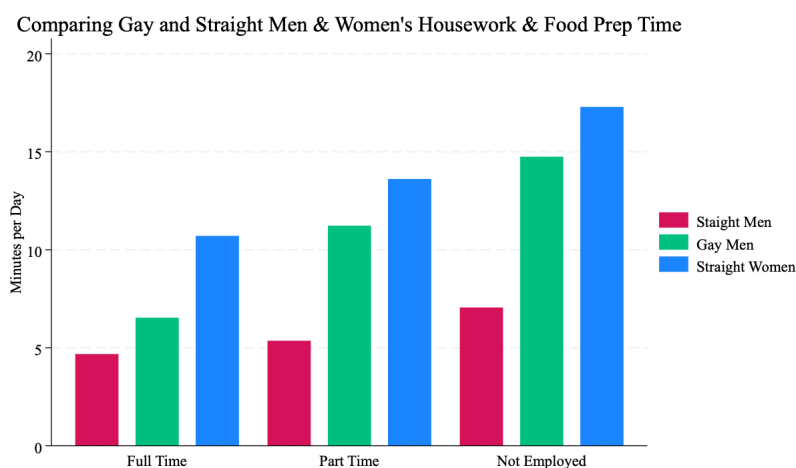
Notes: The distribution of within-couple male less female weekly hours worked in main job for couples where both members are employed. Panel (a) shows data from couples where women have the higher wage. Panel (b) shows data from couples where men have higher wages. Wages are calculated as imputed weekly 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 aged between 20 and 55 years old. Data are from waves 1 through 20 from the Household, Income, and Labor Dynamics in Australia survey.

Figure A.6: Under-response in Employment to the Earnings Ratio by All Men



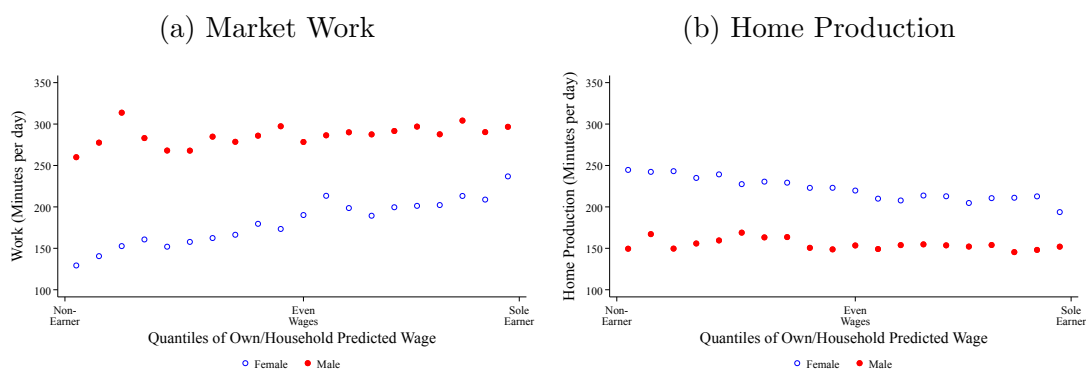
Notes: This figure shows the proportion of straight men and women as well as gay men that are employed across four quartiles of predicted wages. The sample is all heterosexual couples and same-sex male couples from ATUS and HILDA, where both individuals in a couple are between the ages of 20 and 55. For HILDA, the first observation for each unique couple is taken for the sample. Wages are predicted using dummies for education, survey year, age group, and region with fixed effects for country and for metropolitan statistical area for observations in ATUS. Quartiles of predicted wage are computed across the joint sample of predicted wage from both countries.

Figure A.7: Under-response in Home Production Time by Employment



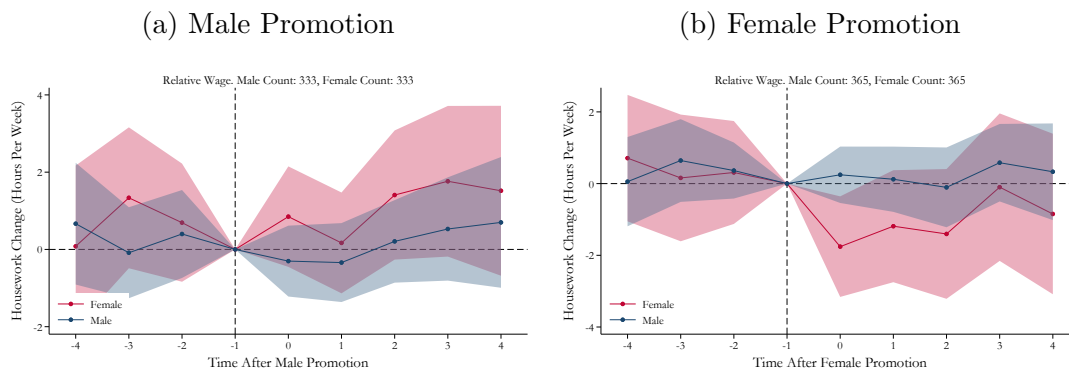
Notes: This figure shows the average level of cooking and cleaning performed straight men and women as well as gay men as a function of employment status. The sample is all heterosexual couples and same-sex male couples from ATUS and HILDA, where both individuals in a couple are between the ages of 20 and 55. For HILDA, the first observation for each unique couple is taken for the sample.

Figure A.8: Time in Market Work and Home Production by the Predicted Wage Ratio



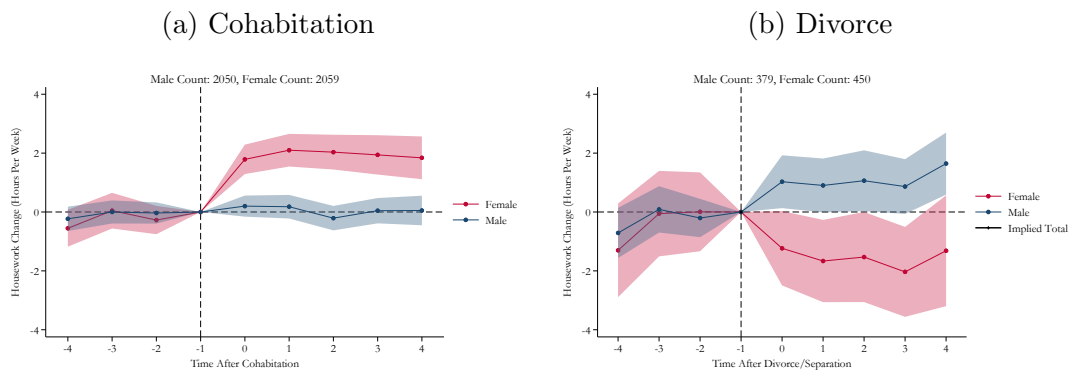
Notes: Data from ATUS, 2003-2020. Heterosexual couples aged 20-55. X-axis shows 20 quantiles of the predicted wage proportion, $\frac{\text{own predicted wage}}{\text{own} + \text{spouse predicted wage}}$. Non-earners are unemployed individuals with an employed spouse, and do not receive a predicted wage, such that the wage proportion is 0. Sole earners are employed individuals with an unemployed spouse, such that the earnings proportion is 1.

Figure A.9: PSID Promotion Events: Relative Wage Change



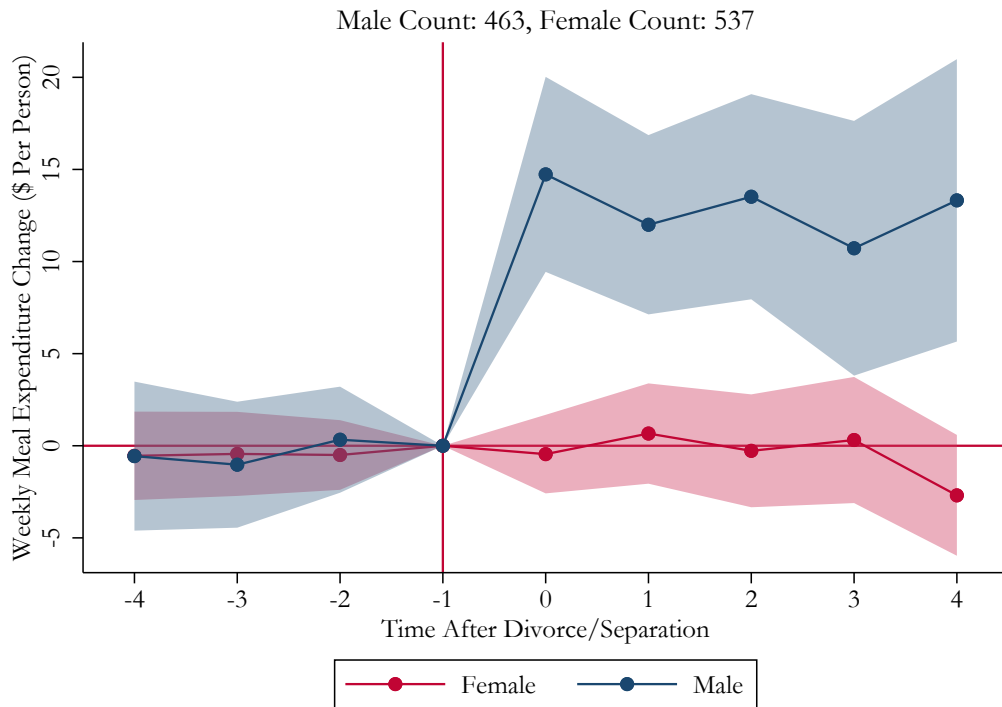
Notes: Plot of event study estimates of the effect of male (Panel (a)) and female (Panel (b)) promotions, defined as entering a new position at unchanged employer since the last year, on reported weekly hours of housework performed by men and women relative to the period before the event ($t=-1$). Additionally, the ratio of the individual's wage to their spouse's must increase by at least 25% after the promotion. Regressions include year fixed effects, dummies for number of children present, and quadratics in both members' ages. 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. Data are from all years between 1985-1997 and the odd years between 1999-2019 of the Panel Study of Income Dynamics

Figure A.10: HILDA Cohabitation and Divorce Events: Housework



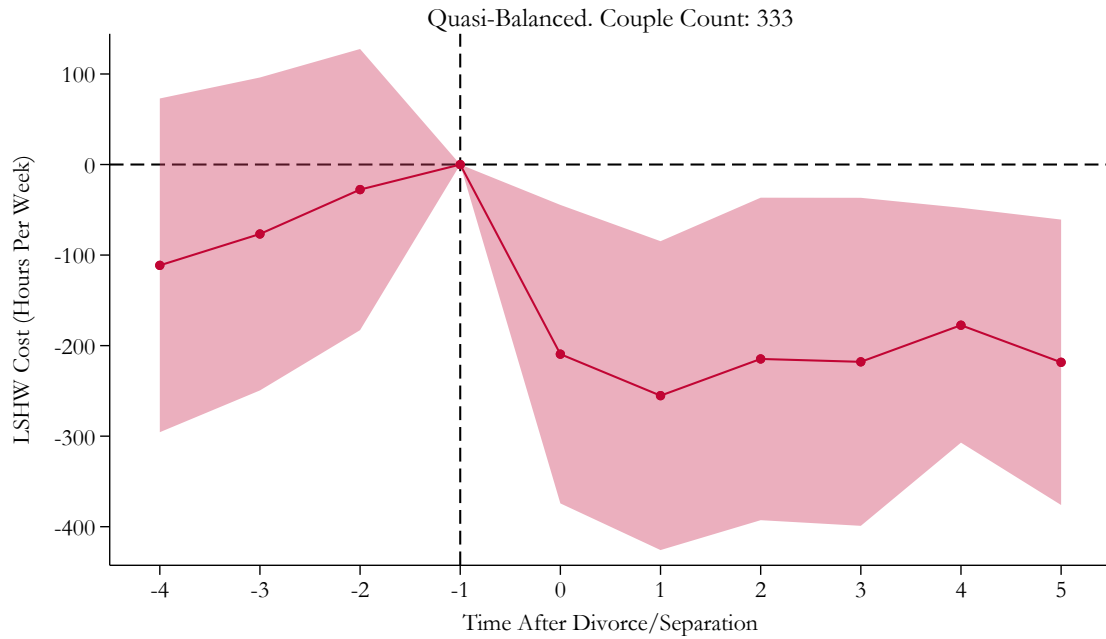
Notes: Plot of event study estimates of the effect of partnership formation (Panel (a)), defined as a new spouse entering an individual's household, and divorce or separation (Panel (b)) on reported weekly hours of housework performed by men and women relative to the period before the event ($t=-1$). The implied change in total housework in each period is calculated as the sum of women and men's estimates. Regressions include year 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. Data are from waves 1-20 of the Household, Income, and Labor Dynamics in Australia survey.

Figure A.11: Per-Person Meal Expenditure after Divorce, HILDA



Notes: Plot of event study estimates of the effect of partnership dissolution (divorce or separation) on imputed weekly household outside meal expenditure 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 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. Data are from waves 1 through 20 from the Household, Income, and Labor Dynamics in Australia survey.

Figure A.12: Housework Cost after Divorce



Notes: Plot of event study estimates of the effect of divorce in the HILDA on the cost of weekly hours 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 are predicted for unemployed women and men by estimating the following empirical models by gender using those employed part-time: regressing wages on individuals' marital status (cohabiting, married, or single), a quadratic in their age, and dummies for year, statistical area, education (masters or doctorate, grad certificate, Bachelor's degree, diploma, Certification level III or IV, high school, or less than high school), 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. Event study regressions include year 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. Data are from waves 1-20 of the Household, Income, and Labor Dynamics in Australia survey.

Table A.2: Satisfaction and Employment Status

	Cohabiting			Single		
	(1)	(2)	(3)	(4)	(5)	(6)
Full-Time	-0.0632*** (0.0136)	-0.0428*** (0.0130)	-0.0555*** (0.0136)	0.00904 (0.0126)	0.0354*** (0.0129)	0.0116 (0.0126)
Male	-0.184*** (0.0293)	-0.150*** (0.0278)	-0.171*** (0.0293)	-0.00928 (0.0286)	0.000240 (0.0285)	-0.00798 (0.0287)
Male × Full-Time	0.0898*** (0.0157)	0.0685*** (0.0148)	0.0820*** (0.0157)	-0.0235 (0.0162)	-0.0326** (0.0162)	-0.0239 (0.0162)
Linear Wage	Yes	No	No	Yes	No	No
Flexible Polynomial Earnings	No	Yes	No	No	Yes	No
Log Wage	No	No	Yes	No	No	Yes
Observations	39039	42697	39039	19821	20132	19821

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 logged hourly wage. All regressions include state, statistical area, child, own and spouse (if relevant) education fixed effects, and quadratics in ages of both couple members (if relevant). All errors 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.

B 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 $f(\cdot) = \sqrt{\cdot}$.

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:

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

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

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

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

or

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

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

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

Replacing in the original FOC, this gives us

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

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

The time devoted by women at home will be given by

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

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

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

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

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

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:

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

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

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

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

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

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

This simplifies to

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

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.