Collateralized Marriage *

Jeanne Lafortune† and Corinne Low‡

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Marriage rates have become increasingly stratified by homeownership. We investigate this in a household model where investments in public goods reduce future earnings, and thus divorce risk creates inefficiencies. Access to a joint savings technology, like a house, "collateralizes" marriage, providing insurance to the lower earning partner and increasing specialization, public goods, and value from marriage. We use idiosyncratic variation in housing prices to show that homeownership access indeed leads to greater specialization. The model also predicts that policies that erode the marriage contract in other ways will make wealth a more important determinant of marriage, which we confirm empirically.

JEL Codes: D13, D14, D31, J12, J22, J24

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†Pontificia Universidad Catolica de Chile, jlafortune@uc.cl

‡University of Pennsylvania, The Wharton School, corlow@wharton.upenn.edu

1 Introduction

Marriage has declined as the central organizing structure of the American family. As more individuals choose non-marital fertility, one might wonder whether marriage is too strong a contract, leaving people seeking a weaker alternative. Yet marriage rates have remained persistently high for homeowners, leading to a puzzle as to why the value of marriage and homeownership may have become more intertwined over time. We theoretically and empirically study this puzzle by proposing that homeownership provides extra security—collateral—in the marriage contract, and the value of this security has increased as the marriage contract has otherwise eroded.

We present a model of the household where investments in public goods come at the cost of future earnings. In the model, a couple faces a choice of how much each partner should invest in a public good, at the expense of individual human capital in the next period.[1] As the two partners' costs of investment are not equal, they will optimally choose some specialization.[2] Under complete marital contracting, a partner specializing in home production receives the assurance that her consumption level will be protected, even if the relationship sours. However, with the introduction of unilateral divorce, the inability to commit to a post-divorce allocation causes the lower-earning partner's consumption to fall in the case of divorce (as shown by Foerster (2020) and Fernandez and Wong (2017)), which creates a higher marginal cost of investment. This, in turn, will create inefficiently low specialization, as shown in theoretical (Mazzocco et al., 2014; Chiappori and Mazzocco, 2017) and empirical (Bronson, 2014; Stevenson, 2008; Fernandez and Wong, 2011; Stevenson, 2007; Reynoso, 2017) results that couples facing divorce risk fall short of efficient decision-making.[3] The resulting higher cost of public good creation will lead to a lower value of marriage.[4]

What distinguishes our model from prior work is the idea that collateralization, in the form of a joint asset such as a house, can provide a commitment device that substitutes for the lost contracting security of marriage. Because the marriage contract uniquely specifies that joint assets are to be divided at the time of divorce, a couple with access to joint savings technology such as homeownership can provide some insurance to the lower earning partner through asset division. This paper brings the positive role of a "storage" technology in the more general problem of limited commitment as discussed by Ábrahám and Laczó (2018)

[1] Rather than focusing on the choice between labor and leisure (e.g., Chiappori et al., 2002; Voena, 2015; and Chiappori and Oreffice, 2008) our model emphasizes the productive value of time away from work for creating household public goods.

[2] It has long been thought that one of the advantages of marriage may be in the ability to specialize (see, e.g., Pollak, 2011). Although female labor force participation is much higher than 50 years ago, household specialization still persists, as evidenced by the gender hours gap, women's greater time outside the workforce when having children, and the large difference between wages when women enter the workforce versus at age 40 (Mazzocco et al., 2014; Gayle and Shephard, 2019; Bronson et al., 2017). A simultaneous convex return to hours in the labor market (Cortés and Pan, 2019; Gicheva, 2013; Kuhn and Lozano, 2008; Goldin, 2014) and high returns to time investments in children (Del Boca et al., 2013; Doepke and Zilibotti, 2017; Ramey and Ramey, 2010) mean specialization can be optimal even in couples who can afford to outsource many household tasks. Even beyond children, the ability to sacrifice one partner's earning capacity for the other may be an important source of value in marriage, such as location choices for one partner's career.

[3] Other work focusing on the broader effects of unilateral divorce include Friedberg (1998); Ananat and Michaels (2008); Holden and Smock (1991); Gruber (2004); Cáceres-Delpiano and Giolito (2008); Wolfers (2006). Mechoulan (2005) summarizes the theoretical approaches to divorce in the literature. While many authors have explored the reasons for declining marriage rates, and accompanying increases in non-marital fertility (Akerlof et al., 1996; Mechoulan, 2011; Duncan and Hoffman, 1990; Rosenzweig, 1999; Nechyba, 2001; Neal, 2004), ours is the first to explore the role of assets in substituting for other legal protections. We also relate to literature looking at the strengthening of non-marital contracting, including child support enforcement in the US (Aizer and McLanahan, 2005; Tannenbaum, 2015; Rossin-Slater, 2017; Brown et al., 2015), common law marriage (Grossbard and Vernon, 2015, 2014), and protections for cohabitants in other countries (Chiappori et al., 2017b; Chigavazira et al., 2019).

[4] This is an application of the general result that limited commitment reduces risk-sharing between agents, see Kocherlakota (1996).

to the domain of family economics. Collateralization will decrease the incomplete contracting distortion, and thus increase specialization and investment in public goods.[5] Collateralized marriages also have increased stability, which further decreases the costs of specialization. Couples able to access collateralization therefore experience a higher value of marriage.

The model produces several testable implications. First, greater access to collateralization, through easier home purchase, should increase specialization. We may also expect couples with greater collateralization access to invest more in public goods and be more stable. Second, because investment in joint assets such as a house require wealth, the model predicts that individuals with higher assets will select into marriage more, and this pattern will intensify as the marriage and non-marital fertility contracts become more similar in ways other than asset division.

To test the first implication, we use idiosyncratic variation in housing prices around the time of marriage as a proxy for access to homeownership, since purchasing a home requires a down payment, which increases in home price. The implication from our model is that lower housing prices around the time of marriage should therefore lead to more specialization, through the channel of collateralization. We use data from the American Community Survey merged with Federal Housing Finance Agency data on historical housing prices, and test the impact of easier access to homeownership on men's versus women's later labor supply. By focusing on outcomes for which the effects for women can be compared to men, we essentially create a triple difference specification, which mitigates concerns that other factors correlated with home prices can be driving the results.[6]

To address the possibility of selection into time or place of marriage, or whether to marry at all, based on favorable housing prices we use housing prices at age 25, the modal age at marriage, in the state of birth. To deal with the possibility of simultaneous causality between housing prices and other local economic factors, or that local housing prices are themselves driven by locally changing tastes for marriage and specialization, we additionally present an instrumental variables strategy, following Palmer (2015). The IV exploits the fact that states exhibit persistent patterns of housing price volatility, either amplifying or dampening national trends. Thus, one can use this historical "multiplier" together with the national price trend to produce an instrument for local housing prices that is not actually driven by local time-varying factors.

We show that idiosyncratic variation in housing prices at age 25 creates persistent variation in homeownership that can be used for identification. We find a stronger first stage on homeownership with the instrument, since, if anything, economic factors correlated with low housing prices may have weakened the ability to purchase and maintain a home. We then show these lower housing prices, and thus higher homeownership, are tied to greater household specialization, with men working more and women working less when they were at peak marriage age in a low-housing-price environment, in both the OLS and IV specifications.[7] Wages follow the same pattern, with men's earnings responding positively to easier homeownership

[5] If offered the choice, the couple will always prefer to save in this "high commitment device," since it moves them closer to the full-commitment optimum. In fact even if the decision were in the hands of the husband, he would choose to save in the vehicle with stronger commitment as long as he values child quality sufficiently highly relative to second-period consumption.

[6] Importantly, for our main outcome of labor supply, the results go in opposite directions for men and women. While it may be the case that women's labor supply could be more or less elastic to, for example, wealth effects, we would not expect men's labor supply to *increase* in response to an income shock while women's decreases (McClelland and Mok, 2012).

[7] It should be noted that this empirical exercise assumes a gendered pattern of specialization that is not inherently necessary in our model, but aligns with the pattern in over 75% of couples and a widespread documentation of the higher career costs of children to women (e.g Adda et al., 2017; Kleven et al., 2019; Bronson et al., 2017; Angelov et al., 2016). "Defiers," couples who specialize the opposite way, and same sex couples, will bias our coefficient estimates downward, and, in fact, we show the

while women's decline, directly linking to our model's predictions for second period earnings.[8]

We perform additional analysis to further pin down the mechanism of our effect and rule out alternative channels. To demonstrate the reallocated labor force time is tied to home production, we use American Time Use Survey data on time spent in work, leisure, and home production. We demonstrate that women more likely to own homes reallocate substantial minutes from work to home production, with no change in leisure. This not only directly ties to our model's predicted effects on public good investments, but also assists in ruling out increases in bargaining power or income effects as possible channels, since in both cases we would expect leisure to shift. We further rule out alternative explanations by showing that results are similar amongst couples who remained in the central business district, and thus not driven by commuting. Moreover, the effect is absent for renters and childless couples, reversed for couples where the woman out-earns the man, and stronger for college-educated individuals, who may have more at risk from lost human capital due to specialization. Consistent with our model, we also find evidence of higher public good provision (as proxied by number of children and educational achievements) and lower divorce rates with easier home access.

We then turn to examining whether the value of collateralization has led to an increased tie between asset ownership and marriage as the marriage contract has been eroded in other ways. We use data on premarital assets from the Panel Study of Income Dynamics and Survey on Income and Program Participation, combined with state-year variation in two policies that made marriage and non-marital fertility contractually more similar. First, the introduction of unilateral divorce, which made the inter-temporal commitment offered by marriage imperfect, and second, the strengthening of child support enforcement for non-marital relationships. We regress the marriage propensity over time on an individual's asset-holding interacted with the policy introductions. Our results show that an individual's wealth became a much stronger predictor of marriage rates as the marriage contract was weakened relative to non-marital fertility. In addition to confirming our model, this suggests an increasing role of asset-holding in determining who can access the benefits of marriage for supporting optimal specialization and child investment. This is of crucial importance because there is currently a policy debate as to whether wealth accumulation among a small portion of society has a deleterious effect, and what policy instruments should be used to correct it (Saez and Zucman, 2016; Alvaredo et al., 2017; Jakobsen et al., 2020). If wealth determines access to a more advantageous marriage contract, which allows for greater specialization and thus more investment in children, it could also impact the inter-generational transmission of poverty.

While it is well established that children of married parents receive more investment than those of unmarried parents (Ginther and Pollak, 2004; McLanahan and Sandefur, 1994), our model suggests that in addition to likely selection effects, marriage itself may causally induce higher public good provision through greater contract strength, and this benefit is not equally available to all. While Lundberg et al. (2016) and

opposite effects are present for these couples.

[8]This may help explain the central importance of home purchases to American families, particularly married couples as shown by Goodman and Mayer (2018). Housing is a large portion of American wealth: principal residences make up 66% of the wealth held by middle-income Americans (Wolff, 2012). This apparent "over-investment" in one type of asset has been documented previously by Fratantoni (1998) and various theories have been provided to explain this pattern (e.g., Henderson and Ioannides (1983) and Flavin and Yamashita (2002)). Why would Americans choose to invest so heavily in an illiquid asset that suffers large price shocks? Our model implies that the illiquidity may actually be an appealing feature of homeownership in terms of its ability to secure the marriage contract. Although in the case of divorce the possession of an "at risk" asset may seem sub-optimal, *ex ante* it provides value by reducing the cost of investments that benefit both spouses. Other types of protection against divorce, if available, would potentially be both more equitable and efficient.

Lundberg and Pollak (2015) speculated that the growing socioeconomic stratification in marriage may be due to it retaining value for those who need stronger commitment due to preferences for investing in children, our model suggests that contract access may be an underlying explanatory factor.

Our paper brings existing literature on the role of assets as collateral in contracts to the household domain. It is well understood that collateral in market transactions has the power to increase efficiency (e.g., by reducing inefficient credit rationing–see Steijvers and Voordeckers, 2009, for a summary of literature). Our paper extends the work of others on asset division in marriage to explicitly discuss its role in allowing specialization, and therefore, increasing *ex ante* the value of marriage.[9]

Our analysis has some limitations. First, it specifically focuses on US marriage and divorce law, and thus may not be generalizable to other settings, where both marriage law and social insurance substitutes may differ substantially (see, for example, Frémeaux and Leturcq, 2018, and Bayot and Voena, 2015).[10] Second, our model applies to couples who may have some gains to specialization, and wish to invest in public goods. Part of the disappearance of marriage may be due to the fact that specialization is less sought by couples, although studies have suggested that US women may not properly anticipate the type of specialized pattern they tend to face once married (Kuziemko et al., 2018), which would make a "collateralized" contract ex-post more attractive.[11]

The rest of this paper is organized as follows. Section 2 presents stylized facts on the increasing tie between marriage and homeownership. We present the model and its predictions in Section 3. We then demonstrate that access to a more collateralized version of the marriage contract alters the behavior of married couples in accordance to our framework in Section 4, and demonstrate that the role of assets in determining selection into marriage has increased as marriage and non-marital fertility have become more similar in Section 5. Section 6 concludes.

2 The Connection Between Marriage and Homeownership

Marriage rates have been declining and rates of non-marital fertility rising over time in the US. Using data from the US Census, we show in Figure 1 that the decline in marriage is driven by those that rent homes, with marriage rates for homeowners remaining high. In the early part of the 20th century there was in fact no relationship between homeownership and marriage rates, whereas there is quite a strong relationship today. This suggests that either the value of homeownership is higher in marriage, or the value of marriage is higher with homeownership, and that this is a relatively recent phenomenon. Naturally, having positive assets is a key predictor of being able to purchase a home, and (Lafortune and Low, 2017) shows marriage

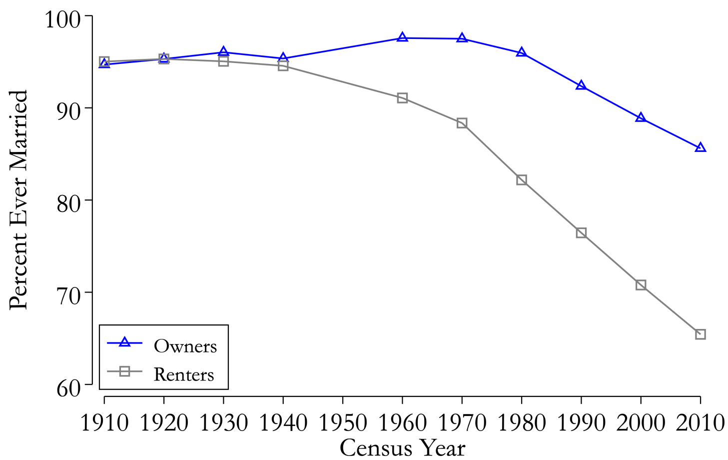
[9] Most notably, this has been discussed by Voena (2015), who shows that unilateral divorce has differential impact on existing marriages depending on the property division regime. Marital assets also feature in Brinig (1990) and Ambrus et al. (2010). Chiappori and Mazzocco (2017) discuss the fact that transferring resources to the spouse specializing in home production will lead to more specialization and marriage gains, how collateralization through homeownership enables this has not been shown before. In terms of housing as a marital asset specifically, Farnham et al. (2011) show that higher house prices make marriages less stable, while Lagomarsino et al. (2017) show that a lottery that provides homes counterintuitively increases reported domestic violence. Wei and Zhang (2011) and Wei et al. (2012) document the role of homeownership as a precursor to marriage in China.

[10] In particular, our model relies on a framework for marital property where husband and wife are assumed to be a single economic production unit. Countries with different marital contracting regimes and greater social insurance outside of marriage may require different analysis frameworks.

[11] Our work thus also relates to literature on rising female labor force participation and the decline in specialization more broadly (Goldin, 2006; Fernández, 2013; Greenwood et al., 2005).

is also highly related to assets, even after controlling for other factors like education, income, and race, and despite divorce being complicated by the presence of assets. In fact, recent news and policy reports have speculated that marriage is becoming a "luxury good."[12]

Figure 1: Rates of Ever Married by Home Ownership Status



Notes: Rates of individuals age 30-50 ever being married by whether they live in an owned or rented home, from US Census data from 1910 - 2010. Homeownership is measured for the household head, rather than the individual respondent.

The evolution of the marriage contract provides some hints as to what may have changed over time. In Table 1, we can see that prior to the 1970s, the marriage contract offered many things that non-marital fertility did not, including parental rights and responsibilities for fathers, income sharing upon separation, a need for mutual agreement to separate, and asset division upon separation. With the introduction of unilateral divorce in the 1970s and parental rights and responsibilities for non-marital fathers in the 1990s, the marriage and non-marital fertility contracts became more similar in all regards except for the presumed "jointness," and thus division, of any assets acquired during the relationship.

Table 1: Convergence Between Marriage and Non-Marital Fertility (NMF) Contract

	Pre-1970		Today	
	Marriage	NMF	Marriage	NMF
Mutual consent to separate required	✓			
Income sharing upon separation	✓		✓	✓
Parental rights for father	✓		✓	✓
Asset division upon separation	✓		✓	

Notes: Unilateral separation from marriage was introduced at the state level in the 1960s and 1970s (see Voena 2015). Parental rights for non-marital fathers and income sharing (child support) was introduced in the 1990s as part of welfare reform (see Rossin-Slater 2016).

[12] "Affluent Americans Still Say 'I Do.' More in the Middle Class Don't," Wall Street Journal, March 8th, 2020, and "Middle Class Marriage is Declining, and Likely Deepening Inequality," Brookings Institute, March 11th, 2020. This is also consistent with findings in sociology literature of a relationship between wealth and marriage (Schneider, 2011).

Family homes are likely to have an especially high commitment value to couples, as the family home is more often allocated to the mother in divorce proceedings, as it tends to accompany physical custody of children, irrespective of the specific legal regime (Weitzman, 1981).[13] The mother may additionally be granted usage rights of the home for some period of time, even if it is to be equitably divided upon sale. Moreover, whereas other forms of savings can be hidden or liquidated before divorce, homes are observable and illiquid. Because the marriage contract will treat mortgage payments made from income as joint property, investing in a family home guarantees that unequal earnings will be contributing toward a shared, and ultimately divisible, asset.[14] Alternatives, e.g., divorce insurance, are scant since private markets would be riddled with private information problems.[15] Moreover, housing has the advantage of offering other useful services, while also being ingrained in US culture—a part of the "American Dream" (Goodman and Mayer, 2018). The centrality of homeownership to American marriage and divorce "traditions" is demonstrated by a quote attributed to various celebrities: "Instead of getting married again, I'm going to find a woman I don't like and just *give* her a house."[16]

Figure 2 further demonstrates the link between homeownership and marriage, by examining homeownership rates per 4 month SIPP period for men aged 21-35 around the time that they marry or first have children. Home acquisition rates spike precipitously for those in the period immediately following marriage, going from around 25% homeownership to 50% within 2 years. For a different life event, the birth of a first child, we see no such spike in home acquisition. Rather than acquiring a home to accommodate a growing family, we see that individuals in fact generally have high rates of homeownership *before* having children. When we specifically look at those who have a first child outside of marriage, non-marital fertility (NMF), we see low rates of homeownership that do not increase after the birth of a child. This is suggestive evidence that the contract of marriage and homeownership are closely intertwined, and means that differential access to homeownership at the time of marriage may have long-lasting effects.

However, just as Figure 1 demonstrates that only recently has homeownership become strongly predictive of marriage, it is also the case that this tight association between marriage and becoming a homeowner is a relatively recent phenomenon. Figure 3 shows the homeownership rates for young married couples (18-30) from 1960 to 2000. Rates of ownership increased from 40 percent in 1960 to 54 percent in 1980, during the period when divorce was being liberalized, and therefore when the need for "collateral" in a now weakened contract was heightened. Meanwhile, the ownership rates for singles stayed constant. In other words, young couples appeared to seek homeownership increasingly as the security of the marriage contract declined, suggesting an active demand for this source of collateral.

Together, these stylized facts demonstrate that homeownership appears to play an important role as "collateral" in marriage, and that its importance has increased over time, as the contracting security of marriage has otherwise eroded. We next present a theoretical model that can explain the role of collateralization in increasing the value of marriage, and provide testable predictions.

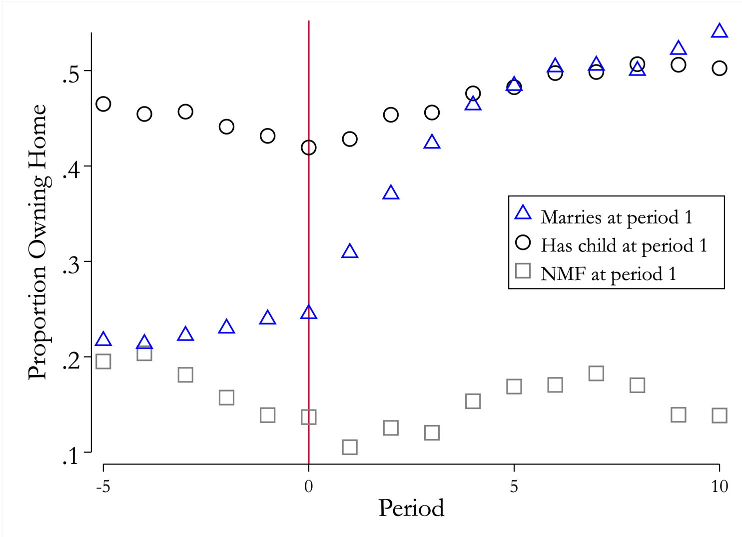
[13] And, specialization may strengthen the chance of this allocation (Wong, 2016).

[14] Note that this does not mean that cohabiting couples cannot purchase a home jointly, but the equity each puts in remains their own property. Home purchase cannot be used to bind one member of the couple's resources as joint property. In marriage, even if one spouse pays for every single mortgage payment, the home is still joint property.

[15] Divorce insurance would suffer from clear adverse selection and moral hazard problems. Joint annuities could be used for this purpose but are also not highly present in the market due to imperfect information issues. Prenuptial agreements are complex and sometimes thrown away by divorce courts, especially when they stray too far from what one is legally entitled to.

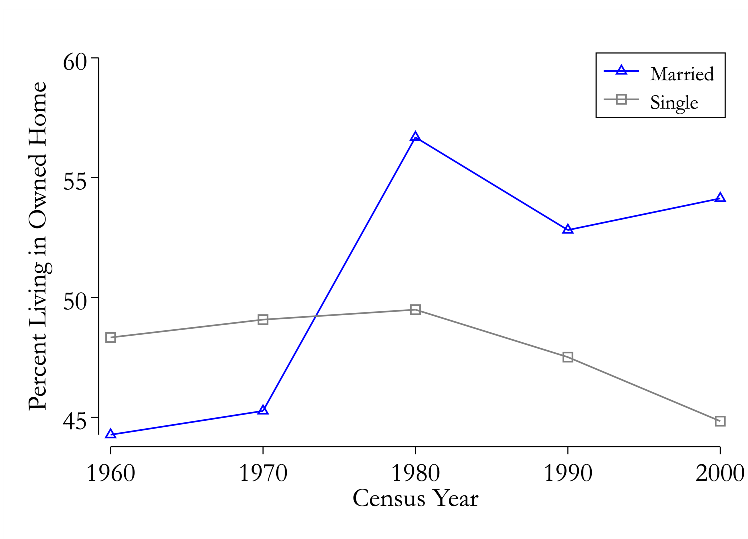
[16] Most reliably attributed to American humorist Lewis Gizzard (Sherrin, 2008), the quote has also been linked to Rod Stewart and Willie Nelson.

Figure 2: Association Between Marriage and Home Purchase (Compared to First Births)



Notes: Data uses the 2008 Survey of Income and Program Participation (as this dataset has 16 waves, versus more recent surveys that follow an annual structure). It restricts the sample to men who enter the first wave without a previous life event (marriage or first birth) and for whom we observe such a life event during the subsequent 15 waves, with each period being 4 months. The wave of the event is normalized to 1 and then average homeownership is charted in each wave before and after that point. "NMF" indicates non-marital fertility, which here is individuals who have a child but do not marry over the course of the data.

Figure 3: Rates of living in owned home over time, by marital status, ages 18-30



Notes: Rates of individuals living in a home that is owned (or being purchased) in the US Census from 1960 - 2000. Singles includes all unmarried (even if cohabiting). Homeownership is measured for the household head, not necessarily the individual in question. We include non-heads to ensure that selection between head status is not driving the results.

3 Model

We present a collective model of marriage with a public good in which both parents can invest, at a cost to their future earning potential. Standard household theory predicts that when partners cannot commit to allocations upon divorce, household specialization will be reduced as will investments in public goods.

We introduce the possibility of a savings vehicle whose returns are divided more equally than income upon divorce. Access to this product reduces the inefficient investment problem since it offers insurance to the partner who makes the greater investment as well as reduces the other partner's incentives for divorce. This increases household specialization, raises public good creation, and in turn raises the value of marriage.

3.1 Setup

A couple lives for two periods, and care about private consumption (c), over which they have concave utility, and a public good (Q). Utility for partner k in period t is thus of the form $U_{kt} = u(c_{kt}) + Q$.

Let Ω_i represent the earnings potential of the lower earning partner and Ω_j represent the earnings potential of the higher earning partner. For convenience, we will call the higher-earning partner, j, the male partner or husband, and the lower-earning partner, i, the female partner or wife, matching the empirical fact that women tend to be lower earners on average. However, one can think of the market earning capacity as being adjusted for home productivity, as we discuss below.[17]

In the first period, couples select the level of time investment for each partner to make in the public good, τ_i and $\tau_j \in [0, 1]$. One example of a household public good would be children, but there can be other household public goods as well. These investments come at the cost of future earnings. We assume partners are restricted to spend a unit of time investing in either work or the public good.[18] Thus, partner k's second period earnings will be $\Omega_k(1 - \tau_k)$. As a result, the higher is the level of investment, the higher the utility partners derive from the public good, but also the lower the consumption possibilities in the second period.

The function $Q(\tau_i, \tau_j)$ is concave in both arguments, and for simplicity is symmetric in τ_i and τ_j and has the property that $\frac{\partial Q}{\partial \tau_k} \to \infty$ as $\tau_k \to 0$. These restrictions mean that neither partner has an absolute advantage in investing, and both partners would find it optimal to invest at least a small amount.[19] Note that it would be easy to replace the unequal earnings capacity with an unequal return to investing in public goods.[20] Thus, one should think of the partner with the lower Ω as the partner with the comparative advantage in household investments, and the partner with the higher Ω as the partner with the comparative

[17]Our theoretical analysis can apply to any couple with a difference in relative earning power. However, our empirical estimations will follow the statistics that women tend to be the lower earning partners on average, which is true for 75% of couples in our sample. In addition to traditional gender norms, this may follow from the fact that pregnancy, birth, and breastfeeding all must necessarily be done by the mother, and therefore mothers typically have a higher household productivity in these aspects, although the gender wage gap also persists for adoptive parents (Kleven et al., 2020).

[18]Unlike Voena (2015) and Chiappori and Oreffice (2008), our model does not feature leisure, Our results would still go through if we allowed men and women to split their time between labor, leisure, and investment–the key is simply that some time is spent on the creation of public goods, which is supported by time use data showing that for married women with children, non-labor hours are split roughly equally between leisure and investment in public goods.

[19]Relaxing that assumption would simply make our results more stark.

[20]The fact that there is evidence of convex returns to work hours, particularly for high skill occupations, would also increase incentives for specialization between partners (Cortés and Pan, 2019). There is also evidence that higher skill parents may have higher productivity than hired care.

advantage in market work.[21]

In the first period, couples earn only fraction μ of their Ω, representing income growth over time. However, they also have access to assets, $A_i + A_j = A$. They can transfer resources from the first to the second period through savings, s, with a return of r.

Utility in the first period is certain, while utility of each partner in the second period if they remain married is subject to a common utility shock, ϕ, centered around zero, whose cumulative distribution will be denoted $L(\phi)$. Bad shocks may cause individuals to prefer dissolving the relationship, in which case they avoid the shock. Assuming divorce does not destroy any value for the couple, Pareto separation occurs whenever $\phi < 0$.

Partners cannot commit to a post-divorce division of resources. This is equivalent to assuming unilateral consent to divorce. Although there may be some income sharing mandated by the court in divorce, we assume it will not make up for the full income sharing within marriage (Del Boca and Flinn, 1995). Thus, in the case of divorce, each partner will consume a share $\beta > \frac{1}{2}$ of their own income, and $1 - \beta < \frac{1}{2}$ of the other party's income, making consumption when divorced more reliant on one's own earnings. Additionally, savings will be divided with some proportion $\delta \leq 1 - \beta$ going to the lower-earning partner, and $1 - \delta$ going to the higher earning partner. Thus, we assume for now that assets are less equally divided upon divorce than income to illustrate the impact of imperfect commitment.

Because of this imperfect commitment, there is a range of $\bar{\phi} > \phi > 0$ over which the richer partner will want to separate but their partner will not. In that case, if the lower income partner wishes to remain married, she will need to offer her partner the utility he would obtain in divorce. We call this state "renegotiation".

Consumption whenever $\phi < \bar{\phi}$ will deviate from the married values. Specifically, when divorced, $\phi < 0$, it will be c_{2i}^d and c_{2j}^d above, and when consumption is renegotiated, but divorce avoided, consumption will be c'_{2i} and c'_{2j}, where $u(c'_{2j}(\phi)) = u(c_{2j}^d) - \phi$. The expected utility in the second period is a weighted average of three scenarios:

$$E(u(c_{2i})) = \underbrace{(1-\bar{p})(u(c_{2i}^m))}_{\text{marriage}} + \underbrace{\int_0^{\bar{\phi}} (u(c'_{2i}))l(\phi)d\phi}_{\text{renegotiation}} + \underbrace{p(u(c_{2i}^d))}_{\text{divorce}} \quad (1)$$

where $\bar{p} = P(\phi < \bar{\phi})$ and $p = P(\phi < 0)$.

Individual k's overall utility is thus:

$$U_k = u(c_{1k}) + E(u(c_{2k})) + (1-p)E(\phi|\phi > 0) + 2Q(\tau_i, \tau_j).$$

The public good function Q is multiplied by 2 since parents enjoy the public good in both periods.[22]

We assume that a couple maximizes the sum of their utilities, or joint household production, over the choice variables of husband's and wife's investments in the public good and savings.[23]

The literature has already established that under the inability to commit to post-divorce allocations

[21] It is also possible for women's smaller Ω to result from labor market discrimination.

[22] The exact assumption as to when the public good is enjoyed is irrelevant to our results.

[23] This is isomorphic to a collective model with symmetric weights, and our conclusions would also hold for unequal weights, as long as consumption is shared more equally in marriage than is mandated in divorce. Our predictions would also go through with private decision making, as we further discuss in Section 3.5.

specialization and investment in public goods will be lower than optimal. If allocations post-divorce were guaranteed to be the same as in marriage, the ratio of their marginal costs of investment will be equal to their relative market productivities, $\frac{\Omega_j}{\Omega_i}$. The unequal sharing in the second period adds an additional cost to the lower earning partner's investment in the divorced state, of a higher marginal utility of consumption. Even without divorce, if the higher earning partner desires separation, sharing will become distorted in order to maintain the relationship, again creating a higher marginal utility of consumption, and thus cost of investment, for the lower earning partner than in the first best. Thus, specialization will be distorted, with the higher earning partner providing more investment and the lower earning partner providing less investment than optimal, and as a result, investment in public goods will be lower as well, since the couple cannot use the lowest-cost means of producing public goods. The formal demonstration of this can be found in Appendix A.1.

3.2 Commitment technology

We now introduce a commitment technology that allows savings to be shared more favorably to the lower-earning partner than second-period income. Specifically, let the savings in that vehicle be divided such that the lower earning partner receives a share $\alpha > 1 - \beta$ of those savings. This correlates to the special status in the marriage contract given to assets accumulated during the marriage. Upon divorce they are treated as *joint* property, because marriage as a legal contract rests on the presumption of division of labor, and thus shared production.[24] Under perfect commitment, this technology would have no effect on decisions. However, under imperfect commitment, we will show that this alters public good investment decisions.

In Appendix section A.2, we show that a couple will always want to put all their savings into this technology. The intuition for this result is that with perfect commitment, the couple chooses equal sharing of consumption to maximize joint utility. Thus, any asset sharing that moves the couple closer to this division is joint utility increasing, and thus the couple will receive more value from saved dollars that are shared more favorably to the lower-earning partner, up to the point at which that sharing replicates the full-commitment division of equal consumption.

Proposition 1 *Under imperfect commitment, if a couple has access to a savings vehicle through which savings are divided more favorably to the lower-earning partner than is income, they will have more specialization within the household than couples without access to that vehicle for high enough values of α. Public goods will be larger and the relationship will be more stable.*

Proof. What determines specialization is the ratio of the marginal costs of investment, given by:

$$\frac{\Omega_i\left((1-\bar{p})u'(c_2)+p(\beta u'(c^d_{2i})+(1-\beta)u'(c^d_{2j}))+\int_0^{\bar{\phi}}(\gamma_\phi u'(c'_{2i})+(1-\gamma_\phi)u'(c'_{2j}))l(\phi)d\phi\right)}{\Omega_j\left((1-\bar{p})u'(c_2)+p(\beta u'(c^d_{2j})+(1-\beta)u'(c^d_{2i}))+\int_0^{\bar{\phi}}(\gamma_\phi u'(c'_{2j})+(1-\gamma_\phi)u'(c'_{2i}))l(\phi)d\phi\right)}.$$

If savings were held constant, it is easy to show that the above expression would be closer to the optimal specialization of Ω_i/Ω_j when having access to the α vehicle, because in the divorced or renegotiated state,

[24] Joint assets are to be divided either evenly (in community property states) or "equitably" (Kay, 2000) upon divorce. As one illustration, if a husband is the sole earner, and therefore pays every single mortgage payment on the family home, these payments nonetheless make up a joint asset that will be divided at the time of divorce.

the lower-earning partner's consumption would increase while the higher earning partner's would decrease. It would also make renegotiation less probable, positioning the ratio of marginal costs closer to the full commitment case.

Thus, to prove that specialization increases with α sharing, we only need to show that savings respond in a way that does not undo these results, which is shown in the extended proof in Appendix A.

Increased specialization will increase Q, the public good investment, since the burden of the investment will now lay less heavily on the higher cost partner and more on the low-cost partner. Finally, relationships will be renegotiated less often, since consumption in the divorced state for the high-income partner will be lower, reducing his desire to want a divorce, leading to more relationship stability. ■

Note that saving into joint assets provides a way for a couple to make up for the lost contracting security of full commitment. The couple prefers to "tie their savings to the mast" in order to enter a more binding contract, and thus reap more value from the marriage. Although here we assume cooperative decision making, even if the decision were in the husband's hands alone, as long as he cares about child quality sufficiently relative to private consumption in the second period, he, too, would prefer to put at least some savings into the commitment channel. Meaning, his total utility can *increase* in the share of assets that are given to his partner upon divorce, up to the value that makes her specialize in home production as in the efficient case. This also provides an explanation for the relative rarity of prenuptial contracts in the US (Weiss and Willis, 1993), since the husband may prefer to guarantee division of joint assets in order to align incentives for public good production.[25]

To empirically test this hypothesis, we use the fact that homes are a type of asset particularly likely to be divided in a way that favors the lower-earning partner. This is because usage rights of the home are often granted to the person who has primary custody until the children reach adulthood. Thus, the same specialization decision that makes the wife lower earning *also* makes her more likely to get a greater share of the value of the home, making it an ideal insurance vehicle. For identification purposes, the ability to purchase a home depends on having sufficient assets for a down payment. The amount of assets required at a specific time will depend on local housing market conditions. Our model offers the result that if access to the commitment savings technology depends on initial asset level, variation in the "threshold" for access will create variation in specialization and public good provision.[26]

3.3 Selection into marriage

We now allow a couple to decide, in the first period, between non-marital fertility and marriage (abstracting away from matching). While non-marital fertility is free, marriage has a utility cost of F, drawn from a random distribution.

We model non-marital fertility as a union that has potentially less income sharing upon separation than marriage, and that does not offer commitment to share assets.[27] In the United States, non-marital rela-

[25] One may wonder why he does not provide such security through a prenuptial agreement that is punitive toward the husband in case of divorce, but investing in joint savings, such as purchasing a home, is likely to be more culturally accepted and easier to implement, as well as providing other benefits.

[26] We present a formal proof of this result in Appendix A.4.

[27] This is in line with Gemici and Laufer (2011), where cohabitation is considered to offer less commitment than marriage, and accordingly, empirically found to have less specialization.

tionships traditionally offered no protection to partners at the moment of separation. Over time, income sharing post-separation has been introduced, in the form of non-marital child support enforcement.[28] However, a similar change has not happened in the case of assets. In non-marital fertility, assets are owned by whoever acquires them, no matter the duration of the relationship.[29] We will thus assume all assets are shared according to $\delta < 1 - \beta$, as in our imperfect commitment case. Our assumption that savings in non-marital relationships are always shared in a way that favors the richer partner stems from the fact that the higher-income partner is more likely to be able to acquire the savings. Replicating asset-sharing outside of the marriage contract would be quite costly and legally complex.[30]

If couples can choose which relationship to enter, the decision will be made based on the total utility partners can ex ante anticipate to receive in each case. Let $V_R(A, \Omega_i, \Omega_j, F)$ denote the joint maximized utility of a couple in a given type of relationship R, including the fixed cost of entering the union. Couples will pick the relationship that offers the highest V_R. We will assume that F is centered above 0, thus that marriage has higher average fixed costs than non-marital fertility, and therefore will be preferred by couples who receive sufficiently large benefits from the stronger contract to justify the costs.

Proposition 2 *If there is imperfect commitment in both marriage and non-marital fertility, but only marriage provides access to the commitment technology, the relative preference for marriage will increase in A for large enough α. Formally, $\frac{\partial V_M(A,\Omega_i,\Omega_j,F) - V_N(A,\Omega_i,\Omega_j,0)}{\partial A} > 0$. For large enough α and low enough δ, the correlation between A and the probability of marriage will increase when marriage becomes more similar to non-marital fertility either because divorce becomes unilateral or when income sharing increases in non-marital fertility.*

Proof. From the envelope theorem, we know that $\frac{\partial V_R}{\partial A} = u'(c_1) > 0$. As A increases, marriage and non-marital fertility thus provide more utility. We already know that in equilibrium $c_1 = 0.5(\mu\Omega_i + \mu\Omega_j + A - s^*)$. Thus, how assets will influence the utility of each type of relationship will entirely depend on the level of optimal savings elected in a given type of relationship. Appendix A.5 demonstrates that savings will be larger in marriage than in non-marital fertility for large enough α, which will mean that first period consumption will be lower in that case. Given that, $\frac{\partial V_M}{\partial A} > \frac{\partial V_N}{\partial A}$. Since savings are larger, the slope of the joint utility function with respect to A will be more positive for imperfect than perfect commitment. Thus, the correlation between assets and the probability of marriage will increase when divorce changes from bilateral to unilateral.

Assume that non-marital fertility sees an increase in its degree of income sharing upon separation, making it more similar to that of marriage. For small enough δ, Appendix A.5 shows that savings will be smaller when the degree of income sharing rises. Since savings will be smaller, this implies that the slope of the joint utility function with respect to A will become less positive for non-marital fertility compared to marriage. Thus, the correlation between assets and the probability of marriage will increase as non-marital fertility becomes more similar to marriage in terms of income sharing. ■

[28] See Section 5.

[29] There is also very little "common law marriage" in the United States–only very few states even allow long-term cohabiting couples to petition the court to be treated as married ex-post, and they must present evidence, such as that a wedding ceremony took place.

[30] This does not imply that it is impossible for cohabiting couples to at least partially replicate this through a legal contract. However, it will be more difficult, more costly, and less secure than marriage. Nevertheless, the key element is that it will be reserved for wealthy individuals who will be able to put something "at risk." Thus, again, those with higher assets will have more household specialization and higher public good provision.

Intuitively, since assets can be consumed in two periods, the marginal utility of consumption between them must be equal (up to the return), and thus the value of assets can be summarized by people's willingness to defer consumption in the first period in order to harness its value in the second. The fact that individuals save more under marriage (when the commitment technology is available) indicates that assets contribute more to utility. And, if assets contribute more to utility in marriage than in non-marital fertility, joint utility from marriage will increase relatively more quickly in assets.

The role of assets in determining marital selection thus grows as marital commitment *not* from assets weakens. This is the case for large enough α and low δ, that is to say for couples where assets would particularly benefit the high earner without commitment technology and would be given with a large enough share to the lower earning partner in presence of that technology.

3.4 Simulations

We simulate these two empirical implications using a parameterized version of our model in Figure 4. Panel (a) shows that falling house prices, when a down payment is required to purchase a home, result in increased specialization and public good production, including when restricting to married couples. Panel (b) shows that as marriage becomes more similar to non-marital fertility, the gradient between marriage selection and asset-ownership increases, with a much larger gap between marriage rates for those without and those with assets when marriage and non-marital fertility are most similar. Moreover, it shows persistently high marriage rates for wealthy individuals under any policy environment, demonstrating a key implication of our model that wealth provides access to a more advantageous marriage contract.

3.5 Extensions

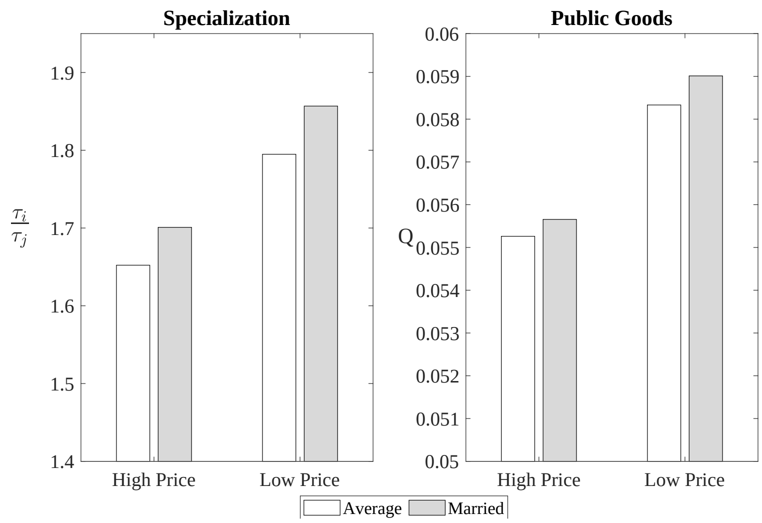
The key driver of our result is that imperfect commitment leads to inefficient investment decisions that can be in part be mitigated by having savings at "stake" to protect the lower earning partner. There are many ways we could generalize this result. In Appendix A.6, we argue that our results would hold even if there is a utility cost of divorce, which would cause lower divorce rates with the commitment technology. The results can also go through if the investment decision was made independently by each spouse, in which case we could also allow the utility to be linear in consumption. We also argue that couples could differ in other aspects, including the utility they derive from children. We could also let couples marry in different periods, which would lead to some individuals to delay marriage to accumulate enough assets to be able to use the commitment device, matching a trend toward simultaneously earlier non-marital fertility and later marriage.

4 The Relationship Between Collateral and Specialization

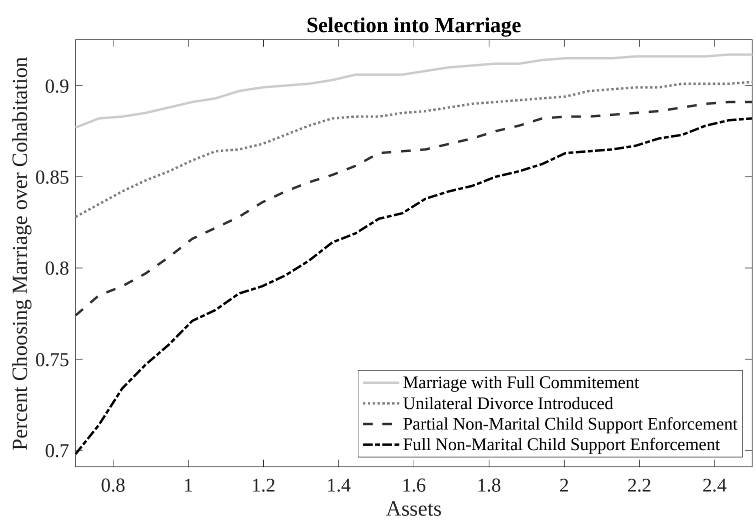
Having shown a model where collateralizing marriage increases labor specialization, household public goods, and relationship stability, we now turn to exploring these predictions empirically. Proposition 1 in our model states that stronger asset division upon divorce leads to more specialization. One way to examine this in observational data is comparing states with more favorable regimes to partners who specialize in home

Figure 4: Simulations of Empirical Implications

(a) Proposition 5: Down Payment Requirement with High and Low House Prices



(b) Proposition 6: Relationship Between Marriage and Assets, by Policy Environment

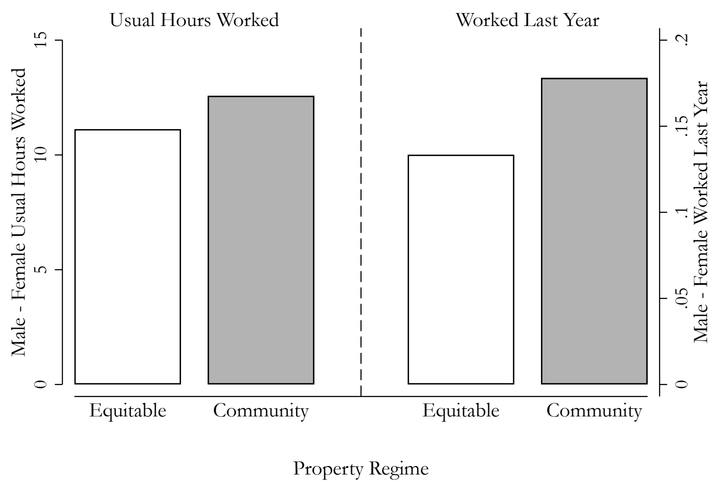


Notes: Panel (a) simulates the impact of lower home prices, reducing the λ required to access the commitment device, demonstrating that specialization and public goods increase. The gray bars restrict to the married population, which builds in the selection effect that also results from this change. Panel (b) simulates the impact of making the marriage and non-marital contracts more similar on marriage selection by initial asset level, first through the introduction of unilateral divorce, and then through strengthening non-marital child support.
Simulation parameters: CRRA utility with $\rho = 1.4$. $\Omega_i = 0.2$ and $Omega_j = 0.5$. First period income share $\mu = 0.5$. Child production $Q = 0.15 * tau_i^{0.2} * tau_j^{0.2}$. Interest rate $r = 1.0204$. Income sharing in marriage: $\beta = 0.75$, in non-marital fertility: $\gamma = 0.9$, and then raised to 0.825 and 0.75. Asset division in marriage: $\alpha = 0.3$, in non-marital fertility: $\delta = 0.1$. Love shock normal(0,2), cost of marriage lognormal(3.8, 2.1). High price $\lambda = 2$, low price $\lambda = 1.2$.

production, and thus contribute less to joint assets. In community property states joint assets are divided equally regardless of contribution, whereas in equitable division states, relative contributions are taken into account.

Figure 5 uses data from the American Community survey to show there is substantially higher specialization in community property states by measuring the difference between male and female labor supply, both on the intensive and extensive margin. The male–female hours gap is 10% larger in community property states, while the gap in extensive margin labor supply is nearly 30% larger, and this is significant in a regression with demographic controls (shown in Appendix Table B.1).

Figure 5: Association Between Community Property Laws and Male − Female Labor Supply



Notes: Both the difference in usual hours worked and worked last year are significant in a regression with controls for race, age, and education, as shown in Appendix Table B.1. Data uses individuals married within the last 18 years in the 2008-2014 ACS. Arizona, California, Idaho, Louisiana, Nevada, New Mexico, Texas, Washington, and Wisconsin are community property states, while the remaining stats are equitable division.

While this offers suggestive evidence, these laws have unfortunately not changed over time, and thus their effect cannot be distinguished from state fixed effects.

To provide evidence that this relationship between the level of commitment and specialization persists with exogenous variation, we use idiosyncratic variation in local housing prices at the time of marriage as a source of exogenous variation in the ability to invest in joint assets, controlling for state and year fixed effects. Because the time of marriage could be endogenous, we rely on variation in housing prices at age 25, the modal age of first marriage in our data. And, to address issues of simultaneous causality of housing prices and other economic factors that could impact labor specialization, we further implement an instrumental variables strategy where housing prices are instrumented with historical patterns.

4.1 Empirical Specification

Our general empirical strategy will consist of estimating the following equation:

$$Y_{i(sct)} = \beta_1 \, HPI_{sc} + \beta_2 \, female_i \times HPI_{sc} + \eta_s + \nu_c + \delta_t + \gamma \, X_i + \psi \, HPI_{st} + \varepsilon_{i(sct)} \tag{2}$$

where the outcome of interest of an individual i, born in state s, who turned 25 in year c, and observed in year t in the ACS is regressed on the house price index when that person was 25 (in their birth state) interacted with whether the individual is female.[31] We include state fixed effects, η_s, cohorts fixed effects, ν_c, and year of survey fixed effects, δ_t, to isolate idiosyncratic variation. To rule out that correlation with current housing prices drives our effects, we additionally control in subsequent specification for the *current* housing price index, which varies by both state and survey year. In addition to controlling for gender, we also add controls for the age of the married individual and their educational attainment in subsequent specifications.

We do not employ the housing price at the time of marriage since marriage timing is endogenous. As shown in Appendix Table B.2, less educated individuals get married in years of low house prices, as predicted by our model. This implies that using housing price at the time of marriage, if anything, would lead us to underestimate the impact of collateral on specialization. We confirm this by replicating our main analysis with year of marriage in Appendix Table B.4.

By looking at the differential effect for labor supply and wage outcomes for women versus men, we are able to rule out that direct effects of housing on, e.g., wealth, drive our effects, in essence creating a triple difference specification. For this reason, these outcomes regarding specialization are our primary outcome measures, and we present at the end additional results for outcomes that our model has predictions for that cannot be measured differentially for men and women: children's outcomes and divorce.

Note that assuming all women are the spouses likely to specialize in home production likely attenuates the effects we measure. For 76% of our sample, the husband works more hours than the wife, and thus the typical gendered pattern of specialization is sufficiently more prevalent than the reverse for this to be effective empirical shorthand. We examine "reverse specialized" couples in our robustness checks.

Controlling for other local and time-varying factors, housing prices at age 25 are uncorrelated with many individual factors that could determine labor supply, and thus provides quasi-exogenous variation to test the predictions from our model. Nevertheless, there remains a possibility that local time-varying factors co-determine specialization and housing prices, such as through tastes for children, or other economic factors. To address this, we use an instrumental variables strategy introduced by Palmer (2015). To create the instrument, historical housing volatility in a state is multiplied by the national housing market trend, either amplifying it or dampening it locally, creating a measure that predicts housing prices, but cannot be related to concurrent local factors. Since the instrumental variable strategy reduces our precision, and the fixed effects specification with prices at age 25, differencing men and women's outcomes already accounts for many confounding factors, we will present both specifications.

To measure the past volatility of the housing price index, we use the yearly price index (all transactions) from 1975 to 1995. We calculate the standard deviation in the year-to-year fluctuation in the housing price

[31] We divide the index by 100 to make the size of our coefficients more manageable, thus making it normalized to 1 in the base year and state.

and obtain a value of σ_s, housing volatility, for each state. We then use this volatility as a multiplier on the leave-one-out national average price changes. Formally, we construct a predicted house price index as:

$$\widehat{HPI_{st}} = HPI_{-s1996} + \sum_{k=1997}^{t} \sigma_s * (HPI_{-sk} - HPI_{-sk-1}) \tag{3}$$

where HPI_{-sk} is the house price index in year k in all other states minus s (we weight the state-level price index by state level population). Thus, our predicted measure simply assumes that the house price index that a state experiences is the one experienced in the other states amplified or dampened by its past variability. It should thus be exogenous to current local economic conditions since it does not depend on these factors in any way.[32] Palmer (2015) conducts the analysis using time dummies instead of the national price index but the logic is very similar.[33]

Our data source is the American Community Survey from 2008-2014. This cross-sectional survey has the advantage of including the age at first marriage, beginning in 2008, from which we can derive the year in which individuals married. We restrict our sample to individuals turning 25 between 1991 and 2014. We merge this database by year in which the individual turned 25 and state of birth to the Federal Housing Finance Agency's housing price index (HPI) based on purchase-only data.[34] The data are available at a quarterly frequency and by state, for which we average over all quarters in a year to obtain our annual index. The HPI is normalized to 100 in the base quarter of Q1, 1991, for each state. In the period of our data, it ranges from around 80 in Hawaii in the 90s to over 400 for Washington, DC in the late 2000s.

In order to illustrate the variation we exploit, we graph residualized housing versus rental prices in example states in Appendix Figure B.1. Housing prices and rental prices are clearly related, but housing prices tend to be much more volatile, exhibiting "boom and bust" cycles, whereas rental prices tend to change relatively smoothly with cost of living. We compare data on state-level rental prices from the Bureau of Economic Analysis (available after 2008) to the housing price index in four large states to show that once state and year fixed effects are taken out, rental prices are basically flat, whereas housing prices exhibit significant local variation. It is exactly this idiosyncratic divergence in the two types of housing costs that would cause housing prices to influence home ownership decisions.

To make this point more generally, we graph each state-year data-point for the residualized housing and rental prices against one another in Appendix Figure B.2, demonstrating that there is little correlation between the two series once both are residualized. This suggests that our housing price index measure will capture variation beyond those shocks that would affect renters. Additionally, we repeat this exercise for the instrument, demonstrating that it, too, is uncorrelated with rental prices, and captures unique variation in housing prices separate from general cost-of-living.

[32] The only way in which this instrument could be correlated with local economic shocks is if the variance we calculated in previous years reflect not only a sensitivity to house prices but also to other economic shocks and that these shocks are reflected in the national price index.

[33] We have obtained extremely similar results when simply interacting the σ_s by the house price index in other states in level because we include fixed effects, which implies that our instrument works as in first differences. We also have found that the weighting of the leave-out average does not matter. Similar results were obtained when using flat weights between states.

[34] Because the purchase-only data is only available starting in 1991, for the instrument construction, we use the data including all transactions, which is available from 1975.

4.2 Effect of Housing Prices on Homeownership

We first show that there is a strong relationship between housing prices, our instrument and the probability of owning a home. The first stage is very strong between the instrument and the actual price index, as shown in the first panel of Table 2. The F-stat for the first stage, in columns (4) through (6), is around 8.8.

We then show that the housing price index at age 25 indeed creates variation in the endogenous variable of interest, homeownership, in the second panel of Table 2. These results suggest that a 1 point change in the re-normalized price index at the time of marriage, approximately the appreciation California experienced from 2011 to 2016, corresponds to an approximately 4 percentage point change in the rate of homeownership. That is, when the housing price index was lower by 1 point when they were 25, couples were 4 percentage point more likely to own a home in the survey year (on a base rate of around 68 percent). This is robust to the inclusion of a control for the year of the survey HPI and for additional controls as described before.

The next three columns show that this relationship is even stronger when using the instrumented price index. The magnitude is even larger than the one with the direct HPI, suggesting that a low price index may also be correlated with bad economic conditions, which dampened its effect on ability to own.[35]

Table 2: Relationship between house price, the instrument and home ownership

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
	First stage					
$\widehat{HPI_{it}}$				0.058***	0.058***	0.058***
				(0.015)	(0.015)	(0.015)
	Home ownership					
House Price Index	-0.041***	-0.041***	-0.040***	-0.136***	-0.135***	-0.134***
	(0.006)	(0.006)	(0.007)	(0.033)	(0.033)	(0.034)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 within the last 18 years who are head of the household or spouses of head of households. House Price Index represents state-level housing prices from the Federal Housing Finance Agency at age 25 divided by 100. Fixed effects for birth year, current year, and state are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level. N=3,220,736 in the first three columns and N=2,585,764 in the last three.

[35] We prefer the reduced form specification to the IV using prices as an instrument for ownership, because prices may not satisfy the exclusion restriction, and thus presenting it as a valid instrument is misleading. Our key argument for the validity of the reduced form specification is that the only channel that prices can impact women's hours in the opposite direction as men's is through collateralization.

4.3 Effect of Housing Prices on Specialization

4.3.1 Labor Supply

Our model suggests that access to a collateralized contract will enable the couple to have more division of labor within the household, captured by decisions over τ_i and τ_j in our model. We examine this by looking at the differential effect of housing prices on men's and women's labor supply in Panel A of Table 3. The baseline effect is the effect for men, while the effect for $HPI \times female$ is the effect for women relative to men. OLS regressions are presented in the first three columns and IV regressions in the last three.[36]

We find that women who faced lower home prices at the time of marriage are less likely to work in the year of the survey relative to men and work fewer hours relative to men. The sum of the coefficients is also negative, indicating that they also worked absolutely less. The magnitudes are such that housing prices being lower by 1 point at the time of marriage, which corresponded to a 3 percentage point higher homeownership rate, leads to a 1 percentage point lower probability of having worked last year and to about 0.8-0.9 less hours worked per week for women (summing the main and interaction effects).

Columns (4) to (6) of 3 repeats the analysis for specialization with the instrumented housing price index. Note that following Wooldridge (1997), we interact the predicted values from the first stage rather than the instrument itself with our gender dummy and use these as instruments for HPI and $HPI \times female$ to maximize efficiency. We find that the asymmetric reaction of men and women in labor supply to the change in the housing price remains even once we instrument the house price index. We continue to find that a favorable housing market at the moment of the marriage increases the division of labor between spouses. In response to an exogenously cheap housing market, women work less while men work more. The coefficient for males is insignificant for the intensive margin and weaker statistically, but the interaction term between female and HPI is always negative and significant (and the sum is also negative).

Importantly, our results show that the effect of lower HPI goes in the opposite direction for men and women. While income effects from home appreciation could potentially create a stronger labor supply effect for women versus for men, the effect would always go in the same direction, and we would never expect men's labor supply response to be positive (McClelland and Mok, 2012).[37] Instead, we see diverging labor supply responses between women and men, indicating that homeownership affects *division* of labor, consistent with our commitment story.

These results are consistent with our model where a fall in the threshold that gives access to the savings technology increases specialization. In the context of our model, this could be interpreted as marriages being more secure due to the investment in joint marital assets, and thus women having less need to protect their own income through higher labor force participation.[38]

[36] We show as a comparison the results of the same regressions using variation in housing prices at the time of marriage in Appendix Table B.4.

[37] While Fortin (1995) suggests homeownership could affect women's labor supply through the channel of needing to pay off the mortgage, this would go in the opposite direction from what we find, and would again be expected to be directionally consistent for men and women.

[38] While other studies connect changes in women's hours to bargaining power (e.g., Voena, 2015), we emphasize the impact on public good provision, which we also measure directly in the next sub-section. Since in our empirical setting there is no legal shock to existing unions, but rather the endogenous decision to purchase a home, any increase in bargaining power results from a joint decision, which we show in our model can be ex ante optimal in order to increase public good provision. Further, in our robustness checks, we show no similar effect for childless couples.

In order to offer some sense of the magnitude of our coefficients, we can do a back-of-the-envelope calculation assuming that lower housing prices at the time of marriage only affects the probability that a household owns a home. This is probably too strong of an assumption but this allows us to put some upper bounds on our effects. If we are willing to make that assumption, we would conclude that being 10 percentage points more likely to own a home lowers the probability that the wife works by about 2 percentage points and increases the usual work hours of men by 2.5 while decreasing that of women by 2. In other words, if a household goes from not owning a home to owning a home (in this calculation), male labor increases by 25 hours and female labor decreases by 20 hours, consistent with the story that owning a home will lead to a significant increase in division of labor.

Table 3: Relationship between house price at age 25 and specialization

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Labor Supply					
	Worked Last Year					
House Price Index	-0.010***	-0.011***	-0.008***	-0.008	-0.004	-0.007
	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.006)
HPI × female	0.018**	0.018**	0.017**	0.021**	0.021**	0.020**
	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.009)
	Usual Hours Worked					
House Price Index	-0.919***	-0.963***	-0.846***	-1.114*	-1.136*	-1.076**
	(0.268)	(0.273)	(0.255)	(0.566)	(0.570)	(0.446)
HPI × female	1.713***	1.713***	1.626***	1.922***	1.918***	1.876***
	(0.474)	(0.474)	(0.442)	(0.624)	(0.624)	(0.572)
	Panel B: Wages					
	Wage (level)					
House Price Index	-6016***	-6160***	-5807***	-14285***	-13530***	-14223***
	(1282)	(1319)	(1329)	(3561)	(3468)	(3662)
HPI × female	8371***	8370***	8126***	8765***	8753***	8677***
	(1288)	(1289)	(1221)	(1387)	(1385)	(1260)
	Log hourly wage					
House Price Index	-0.062***	-0.065***	-0.052***	-0.151***	-0.153***	-0.147***
	(0.012)	(0.013)	(0.013)	(0.033)	(0.033)	(0.035)
HPI × female	0.095***	0.095***	0.076***	0.100***	0.099***	0.084***
	(0.013)	(0.013)	(0.010)	(0.016)	(0.016)	(0.013)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 within the last 18 years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency at age 25 in the state of birth divided by 100. Fixed effects for birth year, current year, and state are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level. For OLS, N=3,709,453 for all outcomes except log hourly wage where N=2,956,363. For IV, N=3,348,288 for all outcomes except log hourly wage where N=2,674,859.

4.3.2 Wages

As the model predicts an effect of collateralization on future earning ability, we should also be able to see a change in wages, which in our model are determined by $\Omega_k(1-\tau_k)$. Moreover, if men are relieved from some of their responsibility to invest in household public goods by greater specialization, they should reap a benefit in wages. We test this piece directly in Table 3, panel B, by examining the impact of housing-price-induced homeownership on the relative wages of women versus men. The first three columns use the OLS specification while the last three employ the IV.

We find that lower housing prices at age 25 are associated with increases in male wage levels, but a negative and significant interaction term for women. The sum of the terms is also negative, indicating that women who married in lower housing price times and areas experienced lower wages. Note that, although positive income effects may decrease hours, there is no reason they would be expected to increase male wages, or have a differential effect on male and female wages. The magnitude of these coefficients reflects the substantial risk undertaken by women specializing in home production, and why they may only be willing to do it when collateral is present.

Results are larger but in the same direction when instrumenting for house prices. These results show that even with no possible influence from local economic factors, and eliminating the possibility that local tastes drive both specialization patterns and housing prices, our results that easier homeownership predict greater specialization hold.

Our findings are consistent with evidence that having children decreases women's wages, while not affecting men's (e.g Adda et al., 2017; Kleven et al., 2019; Bronson et al., 2017; Angelov et al., 2016), but add evidence that women experience these declines more when they are in collateralized relationships, which provide greater insurance for specialization. In couples where buying a home was made easier, women's time is reallocated toward child investments but lower personal human capital accumulation, with the opposite holding for men. These results also provide one possible channel for the male marital wage premium—by offering a secure relationship through which gains to division of labor can be captured, men who marry are able to spend less time on home production and more time investing at work, thereby increasing their wages.

4.3.3 Time use

To demonstrate that the mechanism of the changes in labor hours is through greater specialization, and rule out alternative channels, we turn to a data source where we can examine time in home production directly. The American Time Use Survey documents time spent in a variety of tasks, for a "diary" covering a single 24-hour day for each respondent. The survey is linked to the CPS, and thus basic demographic information is available for each respondent.

To examine the impact of lower house prices around the time of marriage, and thus higher home ownership, on investments at work and at home, we divide daily time use into three broad categories, adding up to the entire day (with the exception of a few missing or uncoded minutes): work, home production, and leisure. Work includes work and work related travel. Home production includes chores, childcare, and home management. Leisure includes both traditional leisure activities, such as parties and recreation, and things one might be expected to do more of with more bargaining power, such as sleep.

Table 4: Relationship between house prices at age 25 and time use (in minutes per day)

	Dependent variable, time in:					
	Work		Home Production		Leisure	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: OLS					
House Price Index	-5.268	-4.374	12.56**	11.90*	-9.178	-9.454
	(7.483)	(7.617)	(6.025)	(6.459)	(7.692)	(7.537)
HPI × female	23.65**	21.29*	-28.52***	-27.05***	2.578	3.496
	(10.94)	(10.99)	(5.424)	(5.359)	(6.729)	(6.718)
Observations	33015	33015	33015	33015	33015	33015
R-Squared	0.224	0.234	0.126	0.133	0.178	0.180
	Panel B: IV					
House Price Index	-5.630	-7.058	-28.76	-27.90	37.58	38.08
	(20.61)	(20.12)	(36.11)	(34.65)	(29.66)	(30.22)
HPI × female	34.45***	32.18***	-32.25***	-30.80***	-3.671	-2.822
	(10.87)	(10.96)	(5.706)	(5.573)	(7.208)	(7.288)
Observations	30879	30879	30879	30879	30879	30879
R-Squared	0.222	0.233	0.122	0.130	0.175	0.177
Year of Survey HPI	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes	No	Yes

Notes: Data uses American Time Use Survey from 2003 to 2019, for individuals who turned 25 no more than 10 years ago. Work is both work and work related travel. Home production includes childcare, housework, and errands, and all related travel. Leisure includes recreation, sleep, and volunteer and educational time. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of turning 25, divided by 100. Fixed effects for the year of birth, current year, and state are included in all specifications, as well as fixed effects for day of the week and holidays. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level.

Table 4 regresses each of these mutually-exclusive time use categories on the home price index, and its interaction with being female. Because we would expect time use patterns to be most impacted when a couple has young children at home, matching the first period in our model, we restrict to individuals who turned 25 no more than ten years ago. Appendix table B.6 repeats the analysis for our main sample, those who turned 25 no more than 18 years ago, and finds highly similar results.

With easier home purchase, women's time shows a substantial reallocation from work hours to home production, with no increase in leisure, consistent in the specialization story. These effects are nearly identical with instrumentation. While instrumenting shows a slightly different pattern in the common effect for men and women, it is not significant. Note, that although we do not see large changes in men's minutes of work, we note that due to the possibility of conducting a secondary activity in the ATUS, it is possible that work time or investments are changing in a way not well-measured with primary activity time use.

Finally, we examine whether somehow the physical space or location of the home itself could be driving a change in time allocation. We confirm in Appendix Table B.7 that there is no change for time spent on the physical space of the home, such as interior or exterior maintenance, demonstrating that owning a home itself does not increase the household tasks workload for women.

These results demonstrate that the increase in specialization in labor hours is tied to a large, differential increase in women's time in home production, and not tied to changes in leisure. We discuss how this assists in ruling out possible alternative explanations such as bargaining or income changes in Section 4.4 below.

4.4 Ruling out alternative explanations

4.4.1 Robustness

We first show that our results are not dependent on a particular sample or time period being selected. For this analysis, we focus only on our most demanding specification, including year of survey HPI and additional controls, for both the OLS and the IV¿ First, given that our mechanism of impact is through homeownership, one would like to see that there is no effect on individuals who do not own homes. In other words, if broad economic trends were at play, or if rental housing were equally efficient in delivering the benefits we find, one might expect an impact also on renters. Although this is conditioning on an endogenous variable, and should be interpreted with caution, Appendix Table B.5 shows that our effect is entirely absent for renters.

Our hypothesized channel would also imply that those who never marry should not respond to the housing price at the modal age for marriage. We repeat our analysis of housing price at age 25 but this time restricting ourselves to *unmarried* individuals at the time of the survey. We show, in the second panel of Appendix Table B.5, that the coefficients are opposite signs for those never married, demonstrating that the channel of impact from housing prices to specialization runs through marriage. We also show that our results are robust to using state of residence instead of state of birth if the former were to be closer to the state where the individual lived when 25. We draw identical conclusions, as shown in the third panel of Appendix Table B.5.

Finally, we also show that our results are robust to excluding the Great Recession years, as shown in the fourth panel of Appendix Table B.5.

4.4.2 General economic conditions

We next address several possible alternative explanations for our findings. First, one may be worried that housing prices stand in for other economic factors that influence specialization. In particular, low housing prices are likely to be correlated with a poorer labor market, which could have a differential impact by gender. We explore this including the state-level unemployment rate at age 25 as an additional explanatory variable, in addition to housing prices. This is a good strategy for the OLS but more problematic for the IV as we include another endogenous variable without instrumenting for it. The results are presented in Panel A of Table 5. They show that our results are similar when including this control. This would be consistent with an environment where as unemployment increases, men are squeezed out of the labor market and women must work more to ensure higher household income. As high unemployment periods should correlate with low housing prices, this suggests that far from being likely to explain our main result, correlated economic conditions may weaken the effects we observe.

Table 5: Ruling out alternative mechanisms: Effect of house price at age 25 on specialization

	Worked Last Year OLS	Worked Last Year IV	Usual Hours Workerd OLS	Usual Hours Workerd IV
	(1)	(2)	(3)	(4)
	Panel A: Including unemployment control			
HPI	-0.007*	-0.005	-0.936***	-1.110*
	(0.004)	(0.006)	(0.239)	(0.602)
HPI × female	0.017**	0.017**	1.629***	1.611***
	(0.007)	(0.008)	(0.421)	(0.508)
N	3,709,453	3,348,288	3,709,453	3,348,288
	Panel B: Only those living in central city			
HPI	-0.018***	-0.030***	-1.241***	-1.883***
	(0.006)	(0.011)	(0.344)	(0.605)
HPI × female	0.018***	0.021***	1.510***	1.719***
	(0.006)	(0.007)	(0.327)	(0.345)
N	479,547	432,082	479,547	432,082
	Panel C: Couples where wife earns more			
HPI	0.003	-0.007	0.023	0.013
	(0.003)	(0.006)	(0.186)	(0.440)
HPI × female	-0.008**	-0.007*	-0.238	-0.147
	(0.003)	(0.004)	(0.210)	(0.266)
N	453,354	401,933	453,354	401,933
	Panel D: Childless couples			
HPI	-0.001	-0.014	0.028	-1.200***
	(0.003)	(0.010)	(0.166)	(0.431)
HPI × female	-0.001	0.000	-0.390***	-0.316*
	(0.002)	(0.003)	(0.136)	(0.170)
N	1,943,009	1,789,354	1,943,009	1,789,354
	Panel E: Only college educated			
HPI	-0.029***	-0.022*	-2.412***	-2.058**
	(0.005)	(0.011)	(0.322)	(0.884)
HPI × female	0.052***	0.055***	4.271***	4.548***
	(0.008)	(0.010)	(0.559)	(0.662)
N	1,364,477	1,221,135	1,364,477	1,221,135
Year of Survey HPI	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes

Notes: Data uses individuals in the 2008-2014 ACS married within the last eighteen years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of marriage, divided by 100. Housing prices in the current year are controlled for in all columns. Fixed effects for the year of marriage, current year, and state are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level.

4.4.3 Suburbanization

Another possible explanation is that cheaper housing prices at the time of marriage may induce couples to move to the suburbs, and thus the specialization we observe is due to longer commuting times faced by these new suburbanites. First, we note that being exogenously induced to own a home by low home prices may in fact make it easier for people to live in more central areas, and thus low HPI is not necessarily correlated with moving far away. Second, we provide a more direct test by restricting our analysis to those in the central city only, shown in Panel B of Table 5. Effects are no weaker for this group.

4.4.4 Wealth effects

As we have outlined, although owning a home may assist in acquiring wealth, it seems implausible that wealth effects could explain the opposite effects for men and women, especially given the increasing work hours for men. Moreover, if income effects account for the change, we might expect total home production time to fall (due to outsourcing) and leisure to increase, when in fact we see higher total home production and flat leisure in Table 4.

We then restrict our samples to women who earn more than their spouses, that is, those who have a non-traditional ratio of Ωs. We understand that this is endogenous but it is interesting to see in Panel C of Table 5 that the results are reversed in signs for these couples. Cheaper housing makes men work less and women work more. Coefficients are not as statistically significant as before in part because we now have only a quarter of the original sample, but these findings support the theoretical implication that the gendered nature of the model's predictions should only hold for couples where women are the lower-income partner. This would be inconsistent with wealth effects always leading women to work less and men to work more.

4.4.5 Bargaining power

Finally, we explore whether our results could simply be due to the fact that the balance of power between men and women is altered by the presence of housing assets without being related to the collateralization of the relationship. As a proxy for couples that could see a shift in balance of powers but little impact on the capacity to specialize, Panel D of Table 5 restricts the sample to childless couples. We see reverse results for hours worked for this group, suggesting that what we capture is more than a change in bargaining weights within the household.

Furthermore, if there were an increase in women's bargaining power, as seen in Voena (2015), we would expect leisure to respond, whereas we found no change in Table 4. The fertility increase for couples with easier homeownership which we detail in Section 4.5 is also inconsistent with a bargaining explanation, since increased female bargaining power is typically tied to fertility declines.

Finally, we further strengthen the link between our results and specialization by examining a group that may have a particularly high cost of lost human capital, while facing higher benefits to specialization, the college educated. High skill women may face particularly substantial losses of earning potential from specialization, and may thus be more affected by the presence of assets to "insure" her investments. On the other hand, college educated couples may have particularly high gains to specialization, given that convex returns to hours may only be present in high-skilled professions, and that high-skilled mother's care is harder to substitute with market care. Panel D of Table 5 shows that the response we have documented is much stronger for college-educated men and women than for the rest of the population. This lends credit to the fact that our results are not driven by other shocks or mechanisms, but rather through the channel of insuring against the negative impacts of specialization in case of marriage dissolution.

4.5 Effect of Housing Prices on Secondary Outcomes

Having shown that housing prices have a strong effect for outcomes for which we are able to essentially implement a triple difference, by comparing men's outcomes to women's, we now turn to secondary outcomes for which we cannot take a difference between men's and women's outcomes, and thus it is harder to rule out direct impacts of housing ownership. Thus, we acknowledge that these results are suggestive only, but we nonetheless wish to show they move in the direction predicted by our model.

We measure household public goods, Q, with two different proxies: whether the child is delayed in school progression and the number of children within the household. We look at children below age 18 because this makes it more likely that they are the children of the marriage we are examining. The first outcome is only available for households that have children of school age, which implies that our sample size is smaller.[39]

We then measure whether the individual has been divorced. In our baseline model, divorce is unaffected but access to a joint savings vehicle reduces the probability of renegotiating the marriage contract. When we allow for child utility to be experienced differently by parents within versus outside of marriage, the model predicts divorce itself will be lower for those who are able to purchase a home.

Table 6 shows each outcome for all both specifications. The table suggests that households that were in a favorable housing market in the year they turned 25 also show some evidence of changes in child outcomes and divorce rates.

In the case of grade retention, we find that couples facing easier housing markets are less likely to see their kids repeat grades. A decrease of 1 point in the housing price at the time of marriage, and corresponding 3 percentage point higher homeownership rate, leads to a decreased probability of having a child who is below the grade for his age by 0.8 percentage points. This could indicate a higher total time investment in each child, with children having higher human capital as a result.

Each child takes more time away from parents. Thus, our model predicts couples who are more insured against divorce will have larger Q, which can be done through both the number of children and the investment in each one. We find that facing a 1 point lower housing price at marriage increases the number of children by 0.07 in the OLS specification, with a larger coefficient in the IV.[40] The results for divorce suggest that divorce decreases when couples are more likely to own a home due to lower HPI. The results for secondary outcome measures are stronger in the IV specifications, suggesting that the correlated economic factors may

[39] To get some sense of the impact on public goods, we also use total labor supply as an outcome, in Appendix Table B.3. These results indicate that being 25 when housing prices were lower leads to less total labor supply from a couple (with women's hours decreasing more than men's increase), and thus potentially greater provision of public goods. However, none of the coefficients are statistically significant.

[40] This outcome may not be well served by a linear model. We thus also estimated a Poisson Regression and found that the results are stronger when using that type of model. Specifically, the coefficient on $-HPI$ in the Poisson is 0.038-0.044 with standard errors of about 0.015, thus leading to t-statistics above 2.45 in all specifications.

Table 6: Relationship between house prices at age 25 and other outcomes

	OLS		IV	
	(1)	(2)	(3)	(4)
	Grade Retention			
House Price Index	0.005**	0.004**	0.024***	0.021***
	(0.002)	(0.002)	(0.006)	(0.005)
Observations	1,765,816	1,765,816	1,558,315	1,558,315
	Number of Children			
House Price Index	-0.070**	-0.067**	-0.348***	-0.336***
	(0.027)	(0.026)	(0.121)	(0.116)
Observations	3,709,453	3,709,453	3,348,288	3,348,288
	Divorced			
House Price Index	0.002	0.001	0.010**	0.008*
	(0.002)	(0.002)	(0.004)	(0.005)
Observations	2,158,247	2,158,247	1,910,614	1,910,614
Year of Survey HPI	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 in the last 18 years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of marriage, divided by 100. Fixed effects for the year of marriage, current year, and state as well as year of survey fixed effects are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level.

work against the model's channels, since getting married in poor economic times may make one less likely to invest in children and more likely to divorce.

One may worry that the positive effect we observe on fertility is driving all of our other results above. First, we note that if fertility alone were the driving mechanism, we would expect leisure time to be reduced, and no fall in home production for men when children were young, which is not what we see in Section 4.3.3 when we examine time use. We also note that we see increases in child *quality* in the age-for-grade results, which points to increased investment per child, which is counter to what instrumented fertility effects show (Bhalotra and Clarke, 2020). Additionally, whereas fertility has been shown to universally decrease women's wages, even when they are high earning (Kleven et al., 2020), we showed in Table 5 that reverse specialized couples in our data react in the reverse manner to the housing shock, with women increasing their labor supply and wages and men decreasing theirs. An increase in women's wages is unlikely to be consistent with fertility effects as the principal driver.

Together, the results on the relationship between housing prices and home purchase, parental time allocation, relative wages, child quality, and divorce suggest that easier access to housing as a joint savings vehicle at the time of marriage has significant consequences on parental outcomes later on, inducing couples to specialize more, shown in both hours and wages, and produce more public goods, proxied by child outcomes. This is very robust to a variety of alternative specifications and suggests that there is real power in collateralizing marriage contracts through housing.

5 The Role of Assets in Marriage Selection

Our model predicts that since marriage specifically provides a contractual obligation to share joint assets, it may be more valuable to people who have positive wealth, and are therefore able to take advantage of the commitment device. This aligns with existing evidence in the literature showing a strong relationship between socioeconomic status and marriage (Lundberg et al., 2016; Schneider, 2011). In Lafortune and Low (2017), we demonstrate that marriage rates are higher for people with higher wealth even conditioning on wages, education, and race.[41] In order to separate this from a selection effect, we now test Proposition 2 in our model, that the differential value of marriage versus non-marital fertility for people with assets will grow as marriage and non-marital fertility become more similar in other ways. Showing that the correlation between assets and marriage has increased in response to these policies additionally provides evidence that the collateralization channel has played a role in the stratification in marriage behavior over time.

To do this, we make use of the state-year variation in the policy changes outlined in Table 1. In particular, we focus on the introduction of unilateral divorce and paternity enforcement for non-marital fathers, whose adoption by states has been treated as quasi-exogenous by other papers in the literature.[42]

Unilateral divorce was passed in a series of state-level policy changes between 1967 and 1992, with the most states changing status between 1970 and 1980 (Friedberg, 1998; Voena, 2015). In our model, unilateral divorce would decrease the level of inter-temporal commitment possible in marriage. Mutual consent divorce is closer to the perfect commitment case than the imperfect commitment one. Division of income within marriage will never be renegotiable when both partners must consent to the divorce, and a post-divorce split, if agreed upon, would be more favorable to the lower-earning partner. Unilateral divorce, by contrast, will be more similar to the case of imperfect commitment. Courts will determine the way resources are shared ex-post and one partner can trigger the divorce procedure, forcing the other partner to renegotiate the sharing rule within marriage.

Enforcement of financial responsibilities for non-marital fathers was increased rapidly during the welfare reform in the 1990s, and made the income sharing guaranteed through marriage and non-marital fertility much more similar (Mayeri, 2016). We focus on one dimension of this enforcement for which we have state-level variation, namely establishing paternity at the hospital at the time of birth Rossin-Slater (2017). Once the father's paternity is formally established, it is easier for courts to enforce his financial obligation to support the child, even if the relationship between the mother and father dissolves. Establishing paternity at the hospital proved effective, because fathers typically attend births, and may be more willing to take on responsibility during this happy period. These "In Hospital Voluntary Paternity Establishment Programs" were thus not themselves a form of enforcement, but enabled enforcement of child support outside of marriage. And, they were rolled out in a staggered fashion by states throughout the 1990s.

[41] To do this, we used the panel nature of the Survey of Income and Program Participation (SIPP) to show that single individuals who have more assets in the first wave are more likely to marry in subsequent periods.

[42] We focus on these policies because there is state-level variation in the roll-out of these policies, which can be used for identification. Historically, marriage offered many benefits beyond those available through non-marital fertility, including paternal rights over children (Edlund, 2006), and divorce was difficult and extremely rare (Kay, 2000).

We focus on the interaction between the policy changes and the impact of asset-holding on the propensity to marry, in panel data. The direct impact of the policies themselves may be difficult to identify due to the possibility of other correlated changes at the state-year level that may relate to marriage rates. However, to our knowledge ours is the only clear mechanism that would indicate a differential change in marriage rates by asset-holding.

5.1 Weakening the Marital Contract

We first examine whether a switch from mutual consent requirements to unilateral divorce led to an increased relationship between assets and marriage. We implement this empirical test using the PSID, since the PSID contains data for the time period when unilateral divorce laws were introduced, mainly in the 1970s. We follow Voena (2015)'s coding of unilateral divorce laws.

We want to measure how the decision to marry is impacted by the interaction of unilateral divorce laws and asset holding at the time when individuals are considering marriage. As the PSID does not regularly add new individuals (other than the children of panel participants), we need to choose a specific time to start looking at individuals. We choose to start looking at individuals at age 22, as this ensures we will cover the period of highest "marriage hazard" for men during the time period we analyze, when median age at first marriage ranged from 24 to 26. Our sample is thus all men who appear as unmarried at age 22 at any point during the sample timeframe. We attach the unilateral divorce status in the year they enter our sample in the individual's state of residence. We then follow them for a maximum of 12 years and measure whether they marry or not. Formally, we regress "ever marry" over the subsequent 12 years on state-of-residence unilateral divorce policy and asset-holding at age 22, controlling for state and year fixed effects.[43]

The equation being estimated is:

$$Evermarry_{ist} = \beta \, unilateral_{st} \times assets_i + \nu \, assets_i + \xi \, unilateral_{st} + \gamma \, X_i + \eta_s + \delta_t + \varepsilon_{ist} \qquad (4)$$

on a panel of men i who turned 22 in year t living in state s. We include individual-level controls as well as state-specific time trends in subsequent specifications.

We designate people with positive assets individuals based on asset income, which is more likely to indicate the types of financial assets that could be invested in a marital property.[44] Prior to 1975, asset income is measured most cleanly for heads of household, and with noise for non-heads. For non-heads prior to 1975, we must infer asset income based on the individual having non-labor income, but not being poor enough for the household to receive welfare transfers. From 1975 onward, asset income is not co-mingled with other types of income for non-heads. Our results are also extremely consistent if we use the asset-holding of the head of the household to proxy for all household members (which avoids changing the definition of asset-holding over time), since this would also likely be a strong indicator of the son being able to place a down payment on a home or save in other ways.

[43] The analysis is robust to other choices of entry points and time windows.

[44] For heads of household we can further restrict to only financial asset income, rather than farm or business income. For non-heads, we cannot restrict the type, but they are also less likely to receive income from a farm or business. We exclude homeownership from assets for two reasons: first, it is only measured for household heads, and secondly, homes owned pre-marriage are unlikely to be divided upon divorce, whereas financial assets that are used to purchase joint marital homes or save in other ways create shared marital property.

Table 7: Unilateral divorce laws and time to marriage, by asset status

	Dependent variable: Ever Married		
	(1)	(2)	(3)
Unilateral × Assets	0.143*	0.170**	0.164**
	(0.073)	(0.075)	(0.072)
Owns Assets	0.083	-0.037	-0.026
	(0.057)	(0.064)	(0.061)
Additional controls	No	Yes	Yes
State-specific time trend	No	No	Yes
Observations	1967	1463	1463
R-Squared	0.144	0.207	0.233

Notes: Data uses unmarried male individuals in the 1968-1993 Panel Study of Income Dynamics, starting at age 22. Outcomes are measured over a 12-year period. State and year fixed effects are included in all specifications. Additional controls include income, education, and race. Standard errors are clustered at the state level.

Table 7 shows that men who turned 22 in a state that had unilateral divorce saw an increased relationship between their asset holding and their probability of marrying within the next 12 years. The coefficient is significant at the 5 percent level in specifications with controls. This aligns with our hypothesis that having assets allows marriage to retain value—through increased commitment and protection for the lower earning spouse—even in the presence of one-sided divorce decision-making. The effect size remains stable with the introduction of individual controls and state-specific time trends. Note that the main effect of assets is not significant, and switches signs as additional controls are introduced. This indicates that asset-holding provides *substitute* commitment for difficult divorce, and thus only matters once unilateral divorce is introduced. Thus, the relationship between asset-holding and marriage is a more recent phenomenon, linked to the decline in the security of the marital contract.

5.2 Strengthening the Non-Marital Fertility Contract

We now use data from the 1992, 1993, and 1996 waves of the Survey of Income and Program Participation (SIPP) to test whether the relationship between marriage and assets was affected by the introduction of IHVPE policies. IHVPE created a mechanism to enforce income sharing in the case a non-marital relationship dissolved, offering one protection previously only provided through marriage. Our model would predict this legal change would widen the marriage gap between high and low asset individuals.

As new individuals regularly enter the SIPP data, there is no need to designate a specific age to begin considering people. We thus assemble a data set encompassing all men aged 21-35 who begin unmarried. The SIPP data is quarterly, and for the period we use includes individuals in a panel for 9 or 12 quarters. The panel itself is short, so we use the full time period for each individual, and naturally will thus have lower overall marriage rates than in the PSID analysis. We regress "ever married" (during the period we observe) on asset holding and the IHVPE policy in the initial period, controlling for state, year, and initial age.

The equation being estimated is:

$$Evermarry_{ist} = \beta\, IHVPE_{st} \times assets_i + \nu\, assets_i + \xi\, IHVPE_{st} + \gamma\, X_i + \eta_s + \delta_t + \varepsilon_{ist} \tag{5}$$

Where s and t represent the state and year the individual i first appears in the data. We add individual-level controls as well as state-specific time trends in subsequent specifications.

Our data on IHVPE dates comes from Rossin-Slater (2017), and all of these policies were implemented in the 90s, during the period of welfare reform. Assets are specifically listed in the SIPP data, and we divide individuals into "asset holding," those with assets greater than zero, and not.[45]

Table 8: Paternity establishment laws and marriage rates, by asset status

	Dependent variable: Ever Married		
	(1)	(2)	(3)
IHVPE × Assets	0.035***	0.033**	0.031**
	(0.013)	(0.013)	(0.012)
Owns Assets	0.041***	0.022***	0.022***
	(0.007)	(0.006)	(0.006)
Additional controls	No	Yes	Yes
State-specific time trend	No	No	Yes
Observations	12816	12816	12816
R-Squared	0.0816	0.0891	0.0926

Notes: Data uses male individuals in the 1992, 1993, and 1996 Survey of Income and Program Participation age 21-35 who enter the data unmarried. IHVPE represents the adoption of in-hospital voluntary paternity establishment programs, shown by Rossin-Slater (2017) to decrease marriage rates. State and year fixed effects are included in all specifications, as are controls for age. Additional controls include income, education, and race. Standard errors are clustered at the state level.

Table 8 shows that individuals who entered the SIPP at a moment where their state of birth had implemented the IHVPE policy observed a greater correlation between assets and the probability of marriage than those who entered when the policy was not yet implemented. The effect size remains consistent even when state-specific time trends are accounted for. And, holding assets itself is positively associated with marriage rates in this time period, consistent with the earlier evidence in Lafortune and Low (2017). Since all states have implemented unilateral divorce over this period, this is consistent with the hypothesis that assets become relevant when marriage provides less commitment. This result highlights the role of assets in creating differential value of marriage, above and beyond that of non-marital fertility contracts, even as these alternative contracts are strengthened.

Overall, we find this evidence persuasive of an increasing role of asset ownership in determining who enters into marriage and who does not. This suggests that as the marriage contract has been weakened by various policy changes, wealth increasingly provides access to a more advantageous contract, and thus confers benefits for family formation beyond those which have been previously considered.

[45] As explained in footnote 44, we exclude homeownership from assets.

6 Conclusion

The decline of marriage has not been universal: marriage rates have remained persistently high for those who own homes, and those with more assets more generally. We present a model that provides an explanation for this stratification in collateralization through homeownership making up for the lost contracting security of marriage as divorce has become easier and non-marital fertility more secure. We demonstrate that a highly general model of investment in a public good with limited commitment can generate the effect that collateralization increases specialization, public goods, and marriage stability. Our model provides the empirical implications that greater access to the commitment technology will lead to more specialization and public good creation.

We show empirical support for this by using idiosyncratic variation in housing prices to proxy for access to the commitment technology, since homes are especially likely to be divided in a way that favors the mother. We show that those families who more easily purchase homes upon marriage due to low house prices specialize more within the household, with men working less and women working more, which further results in diverging wages between men and women. Our results are robust to a number of alternate specifications, including instrumentation with national housing cycles. We also show that households with easier home purchase display more relationship stability and public goods, and that women's time is reallocated from work to home production, with no change in leisure.

The model also suggests that since positive assets are needed to collateralize marriage, the value of marriage will be increasing in wealth, and that this gradient in marriage by wealth will substantially increase as marriage and non-marital fertility become more similar in ways other than their treatment of assets. We test this empirically using the introduction of unilateral divorce and increased ease of non-marital contracting, showing that both made wealth a stronger predictor of marriage.

Together, our empirical results suggest that those with positive assets will have access to a more advantageous marriage contract, and more easily specialize and invest in public goods. This problem has worsened over time, matching the transformation of marriage into a "luxury good." The model also suggests that investment in homes may be a way of purchasing "divorce insurance," which could potentially lead to the documented "over-investment" in homeownership (Fratantoni, 1998). Other protections against immiseration resulting from divorce through either the public or private market could potentially increase efficiency and equity, if they were more accessible to all than is homeownership.

From this stems important implications for inequality and poverty traps. Less access to wealth now means a lower ability to secure investments in the next generation, which will lead to strong intergenerational transmission of poverty. Thus, our paper provides microfoundations for an emerging "parenting gap" that may be driving inequality (Doepke and Zilibotti, 2019) and the large growth in income-achievement gaps over time (Reardon and Portilla, 2016). Moreover, access to wealth, and particularly homeownership, has historically been differential along racial lines, highlighting a new axis of racial disparity.[46] Our model suggests a mechanism linking this gap to a corresponding gap in marriage rates documented in Caucutt et al. (2018), the marital college premium shown in Chiappori et al. (2017a), and high investment parenting

[46] For example, while the white-black income gap is large, the white-black asset gap is *substantially* wider (Kuhn et al., 2020; Hamilton and Tippet, 2015). Moreover, the homeownership gap may be even larger (Charles and Hurst, 2002), since on top of the disparity in financial assets, redlining historically limited the ability of non-white individuals to purchase homes.

documented by Ramey and Ramey (2010). Asset ownership and homeownership have not previously been considered as a key enabler of parental investments, and thus drivers of marital value. This paper presents evidence that it could be an important factor, with stark policy and welfare implications.

Our model also suggests that access to the commitment technology facilitates investment in public goods, and thus that a weakened marriage contract may change how families form and invest.[47] Indeed, the "traditional" division of labor in the household collapsed over the same time period as the marriage contract was substantially weakened (Sayer, 2005). This does not mean a collateralized marriage needs to be a traditional one: As more women increasingly become high-earners, it is possible there would be more specialization in the opposite direction if the legal framework supported it. As the marriage contract has weakened, marriage rates have also fallen, indicating its value may be related to the ability to specialize and insure investments. The way a limited contracting space may have hampered the efficiency gains from marriage, and therefore eroded marriage's value for those not able to collateralize the contract, has received limited consideration. By showing that marriage appears more valuable to those able to collateralize the contract we shed light on the economic value of marriage, and how its returns may be unevenly distributed.

[47] There of course may be compelling reasons to weaken the marriage contract, such as allowing women to leave abusive situations (Stevenson and Wolfers, 2006), but our model highlights some unintended consequences.

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A Omitted proofs

A.1 Imperfect commitment leads to less than optimal specialization

If perfect commitment was possible, consumption sharing would be perfect in the second period and thus, we would have $c_2 \equiv \frac{1}{2} * (\Omega_i(1-\tau_i) + \Omega_j(1-\tau_j) + s(1+r))$ and $c_1 \equiv \frac{1}{2} * (\mu\Omega_i + \mu\Omega_j + A - s)$. Savings are determined by $u'(c_1) = u'(c_2)(1+r)$ and specialization occurs such that $\frac{\Omega_i}{\Omega_j} = \frac{\frac{\partial Q}{\partial \tau_i}}{\frac{\partial Q}{\partial \tau_j}}$

Instead, with imperfect commitment, second period consumption when divorced will thus now be given by:

$$c_{2i}^d = (1-\beta)\Omega_j(1-\tau_j) + \beta\Omega_i(1-\tau_i) + \delta s(1+r)$$

and

$$c_{2j}^d = \beta\Omega_j(1-\tau_j) + (1-\beta)\Omega_i(1-\tau_i) + (1-\delta)s(1+r).$$

It is easy to show that equal sharing will continue to occur in the first period, and in the second period whenever $\phi \geq \bar{\phi}$. However, the lower level of consumption sharing in either the renegotiated or divorced state will affect first period child investment decisions.

This will affect the investment decisions, τ_i and τ_j, which are determined by the following first-order conditions:

$$-\frac{\partial\left[E(u_{2i}) + E(u_{2j})\right]}{\partial \tau_k} = 4\frac{\partial Q}{\partial \tau_k}.$$

Defining the income sharing that occurs for any level of ϕ where renegotiation occurs as γ_ϕ weight placed on own income, where $\beta > \gamma_\phi > \frac{1}{2}$, the left-hand side of the expression will become:

$$\Omega_k\left((1-\bar{p})u'(c_2) + p(\beta u'(c_{2k}^d) + (1-\beta)u'(c_{2k'}^d)) + \int_0^{\bar{\phi}}(\gamma_\phi u'(c_{2k}') + (1-\gamma_\phi)u'(c_{2k'}'))l(\phi)d\phi\right). \tag{A.1}$$

Note that while investment will alter the renegotiation threshold $\bar{\phi}$, that derivative is not included in the expression since the utility of partners is the same in the married and the renegotiated outcome when ϕ is exactly equal to $\bar{\phi}$.

Given that $c_{2j}^d > c_{2j}' > c_2 > c_{2i}' > c_{2i}^d$, then $u'(c_{2j}^d) < u'(c_{2j}') < u'(c_2) < u'(c_{2i}') < u'(c_{2i}^d)$. Since $\beta > \gamma_\phi > \frac{1}{2}$, we have

$$p(\beta u'(c_{2i}^d) + (1-\beta)u'(c_{2j}^d)) > p(\beta u'(c_{2j}^d) + (1-\beta)u'(c_{2i}^d))$$

$$\int_0^{\bar{\phi}}(\gamma_\phi u'(c_{2i}') + (1-\gamma_\phi)u'(c_{2j}'))l(\phi)d\phi > \int_0^{\bar{\phi}}(\gamma_\phi u'(c_{2j}') + (1-\gamma_\phi)u'(c_{2i}'))l(\phi)d\phi.$$

This implies that what is inside the parenthesis of Equation (A.1) will be larger for women than for men, thus leading to:

$$\frac{\Omega_i}{\Omega_j} < \frac{\frac{\partial Q}{\partial \tau_i}}{\frac{\partial Q}{\partial \tau_j}},$$

which implies less specialization than in perfect commitment.

This will lead to lower Q with imperfect commitment, since the household has added constraints compared to the case of perfect commitment. The only way that public good creation could rise is if households previously sacrificed public goods to achieve more consumption sharing. But this is impossible since perfect household sharing decreases the marginal cost of investing in public goods for the household. Thus, imperfect commitment will also decrease household public goods.

A.2 Proof that the commitment savings vehicle will be desired

Assume we allow couples to choose whether to save in a vehicle that will be split according to $\delta \leq 1-\beta$, or to save in a vehicle where the lower earning partner receives share $\alpha > 1-\beta$. Denote savings placed in the vehicle split by α as s_α, and savings placed in the vehicle split according to δ as s_δ.[48] Then, the couple's second period divorced consumption levels will now be given by:

$$c_{2i}^d = (1-\beta)\Omega_j(1-\tau_j) + \beta\Omega_i(1-\tau_i) + \delta(1+r)s_\delta + \alpha(1+r)s_\alpha$$

and

$$c_{2j}^d = \beta\Omega_j(1-\tau_j) + (1-\beta)\Omega_i(1-\tau_i) + (1-\delta)(1+r)s_\delta + (1-\alpha)(1+r)s_\alpha.$$

Define $\bar{\alpha}(s^*)$ as the savings-sharing rule that would make $c_{2i}^d = c_2$, the full commitment consumption level. Up to that point, the higher is α, and the higher portion of savings placed in the α vehicle, the closer resource sharing gets to the perfect commitment case, leading to more specialization and more public good investments.

We now show that under imperfect commitment, if a couple has access to a savings vehicle through which savings are divided more favorably to the lower-earning partner than is income, they will choose to save 100% of their savings in this vehicle as long as $\alpha < \bar{\alpha}(s^*)$

To demonstrate this, denote the optimal utility obtained from the relationship by the couple as V_M. By the envelope theorem, the impact of an increase in α on the ex-ante utility of the couple will be given by

$$\frac{\partial V_M}{\partial \alpha} = p(1+r)s * (u'(c_{2i}^d) - u'(c_{2j}^d)) > 0 \quad \forall \alpha < \bar{\alpha}(s^*)$$

Thus, a couple will always prefer having a larger α. The return on their investment will be larger, and they will save all their savings in this vehicle.

A.3 Completion of Proof of Proposition 1

We need to show that under the commitment technology, savings do not adjust so as to undo the impact of the commitment technology on the ratio of marginal utilities of consumption, which drives specialization.

If a couple has access to the commitment technology, they will pick an optimal savings level $s^*(\tau_i, \tau_j)$ which will give the higher earning partner a consumption level of $c_{2j}^d(\tau_i, \tau_j)$ for each level of investment and

[48] One should have in mind that the higher earning partner could choose savings vehicles that are easy for him to liquidate or dissolve in case of marriage dissolution, or savings vehicles that are illiquid and easily observable by both parties. Joint marital accounts and homeownership are examples of the latter vehicle.

the lower earning partner $c_{2i}^d(\tau_i, \tau_j)$. If they do not have access to that technology, they will pick a savings level given by $\tilde{s}(\tau_i, \tau_j)$ which will give them consumption levels $\tilde{c_{2j}^d}(\tau_i, \tau_j)$ and $\tilde{c_{2i}^d}(\tau_i, \tau_j)$, respectively.

In the absence of any adjustment to savings, the consumption by partner i would increase with the commitment technology, due to her higher share of assets, and the consumption of partner j would decrease. We will first show that it is not possible that savings decrease with commitment enough that partner i's consumption stays the same (or decreases). For that, we can show that a savings level $s^* < \tilde{s}$ such that $c_{2i}^d(\tau_i, \tau_j) = \tilde{c_{2i}^d}(\tau_i, \tau_j)$, which necessarily implies that $c_{2j}^d(\tau_i, \tau_j) < \tilde{c_{2j}^d}(\tau_i, \tau_j)$, is not possible, because the marginal return to savings under commitment when divorced is given by:

$$(1+r)\left(\alpha u'(c_{2i}^d) + (1-\alpha)u'(c_{2j}^d)\right),$$

while the return without commitment is:

$$(1+r)\left(\delta u'(\tilde{c_{2i}^d}) + (1-\delta)u'(\tilde{c_{2j}^d})\right).$$

If savings were decreased to the point that $c_{2i}^d(\tau_i, \tau_j) = \tilde{c_{2i}^d}(\tau_i, \tau_j)$, then the return with commitment is clearly lower, since the two marginal utilities of consumption are the same or lower, $u''(\cdot) < 0$, and $\delta < \alpha$. Furthermore, the probability of renegotiating would be larger, since $c_{2j}^d < \tilde{c_{2j}^d}$, which would further reduce the return to savings. But then this means that there would be a higher return to savings under commitment than not, meaning it would be impossible for savings to adjust to that point or beyond with commitment.

Thus, the optimal savings with the commitment technology would thus necessarily imply that the consumption of the lower income partner would be higher in divorce when one has access to the commitment technology.

We next show that for α large enough, it is not possible that savings increase with commitment enough that partner j's consumption stays the same (or increases). For that, we can show that a savings level $s^* > \tilde{s}$ such that $c_{2j}^d(\tau_i, \tau_j) = \tilde{c_{2j}^d}(\tau_i, \tau_j)$, which necessarily implies that $c_{2i}^d(\tau_i, \tau_j) > \tilde{c_{2i}^d}(\tau_i, \tau_j)$, is not possible because at that point the marginal return to savings when divorced is lower under commitment for large enough values of α. To see this, note that the marginal return is clearly lower for $\bar{\alpha}(s^*)$, the savings-sharing rule that makes $c_{2i}^d = c_2$, since at that point, $c_{2j}^d = c_{2i}^d = \tilde{c_{2j}^d} > \tilde{c_{2i}^d}$. Thus for $\alpha = \bar{\alpha}$, for j to have equal consumption under commitment, the return to savings under commitment must be lower, making it impossible for savings to adjust to that point or beyond with commitment. More generally, the difference in the return to savings with commitment to that without commitment (when $c_{2j}^d(\tau_i, \tau_j) = \tilde{c_{2j}^d}(\tau_i, \tau_j)$) changes with α in the following way:

$$-u'(c_{2i}^d) - u'(c_{2j}^d) + (1+r)s^*\left((\alpha-\delta)u''(c_{2j}^d) + \alpha u''(c_{2i}^d) + \frac{\delta u''(\tilde{c_{2i}^d})}{1-\delta}\right)$$

The first term is positive while the second is negative. For high enough values of α, the first term is relatively small and the second will be large, leading to the derivative being negative. Thus, for large enough values of α, if savings made up for partner j's lost consumption, the return would be lower for the case with commitment when divorced, which would make that option not optimal. A similar argument would hold for the renegotiation case. Here, the probability of renegotiation remains the same because the higher earning partner has the same level of consumption.

Thus, the optimal savings with the commitment technology would necessarily imply that the consumption of the higher income partner be lower in divorce when the couple has access to the commitment technology, for large enough values of α.

Thus, when a couple has access to the commitment technology, we know that the difference between the divorced consumption of the high- and low-income partner will shrink.

A.4 Proof that a fall in housing prices leads to more specialization

Assume only couples with initial $A > \lambda$ are able to access to a commitment technology. A fall in λ will lead to more specialization, higher public good provision, and more relationship stability. Conditional on marriage, this will be the case unless selection into marriage undoes the main effect.

To show this, denote V_M as the value of marriage when a couple has access to the commitment technology and $\widetilde{V_M}$ when it does not with $V_M(A, \Omega_i, \Omega_j, F) > \widetilde{V_M}(A, \Omega_i, \Omega_j, F)$. Define F_M as and $\widetilde{F_M}$ as the maximum cost such that marriage (with commitment and without, respectively) is preferred to non-marital fertility where $\widetilde{F_M} < F_M$. From Proposition XXX, we know that $\frac{\partial F_M}{\partial A} > 0$ while $\frac{\partial \widetilde{F_M}}{\partial A} = 0$. This allows us to separate the population into 3 different groups based on F. For those with $F > F_M$, $V_N > \widetilde{V_M}$, a fall in λ will have no effect. For those with $F < \widetilde{F_M}$, $V_M > \widetilde{V_M} > V_N$, a fall in λ will not impact selection into marriage. However, for those where A was originally lower than λ but now can access the commitment device, Proposition 1 details that they will have more specialization, higher public good provisions and higher relationship stability. Finally, for $F_M > F > \widetilde{F_M}$, a fall in λ will cause those for which $A > \lambda$ to select into marriage and from Proposition 1, have more specialization, higher public good provisions and higher relationship stability. However, they have lower levels of A than existing married couples, which could influence their specialization, household public good provision, or relationship stability. Thus, a fall in λ will increase public good provision and specialization. *Conditional on marriage* specialization and public good provision should also increase, unless the proportion of new couples selecting into marriage is very large, and their lower A leads to lower public good provision and specialization, dominating the effect for existing married couples.

A.5 Completion of Proof of Proposition 2

To complete the proof presented in the main text, we must show that savings will be larger when one has access to the α asset than when one only has access to the δ asset. Denote the consumption levels of partners when divorced when having access to the α asset as c_{2i}^d and c_{2j}^d and that when having only access to the δ asset as $\widehat{c_{2i}^d}$ and $\widehat{c_{2j}^d}$.

Since $\alpha > 1 - \beta \geq \delta$, we can show that the ratio of marginal returns to savings when investing in the α asset compared to the marginal return when investing in the δ asset is always larger than the ratio of marginal costs of investing in τ_j in both cases since this is akin to:

$$\frac{\alpha u'(c_{2i}^d) + (1-\alpha)u'(c_{2j}^d)}{\delta u'(\widehat{c_{2i}^d}) + (1-\delta)u'(\widehat{c_{2j}^d})} > \frac{(1-\beta)u'(c_{2i}^d) + \beta u'(c_{2j}^d)}{(1-\beta)u'(\widehat{c_{2i}^d}) + \beta u'(\widehat{c_{2j}^d})}$$

Thus, to prove by contradiction, assume the optimal savings when having only access to the δ asset is higher than the one when having access to the α savings. It must then be the case that $\tau_j > \widehat{\tau_j}$, that is the optimal investment of partner j in child quality must be higher when having access to the commitment device than when not since the higher return to savings require a higher marginal cost for that partner. The combination of lower savings and higher investment will automatically imply that $c^d_{2j} < \widehat{c^d_{2j}}$. By proposition 3, we also know that $\tau_i > \widehat{\tau_i}$ since having access to α asset increases specialization thus leading to the low-income partner to invest more. If this increased investment was such that $c^d_{2i} < \widehat{c^d_{2i}}$, then the marginal return to investment when having access to the α asset would automatically be larger than when not having access to that asset, which would contradict our assumption above. We must thus have $c^d_{2i} > \widehat{c^d_{2i}}$. In this case, we can show that for α large enough, δ small enough, or for $u''' < 0$, the return to saving with commitment would be larger than that without, which would imply that optimal savings cannot be smaller when having access to the α asset than when not.

For the second part of the proposition, let us define the consumption level in the second period for a marriage with full commitment as $\overline{c_2}$ while that of marriage with imperfect commitment but access to α assets as c^d_{2i} and c^d_{2j}.

Because $\alpha > 1 - \beta$, the ratio of marginal returns to investing in savings between marriage with full commitment and that with imperfect commitment (but access to α savings) will be smaller than the ratio of marginal costs of investing in τ_j for both cases since this is akin to:

$$\frac{u'(\overline{c_2})}{\alpha u'(c^d_{2i}) + (1-\alpha)u'(c^d_{2j})} < \frac{u'(\overline{c_2})}{(1-\beta)u'(c^d_{2i}) + \beta u'(c^d_{2j})}$$

Assume by way of contradiction that the optimal savings in the case with full commitment are larger than that in imperfect commitment. It must then also be that investments in τ_j in the case of full commitment are lower than that in imperfect commitment based on the above inequality. For α large enough (necessarily if $\alpha > 0.5$), this implies that $\overline{c_2} > c^d_{2j}$ which would then imply that the return to saving would be larger for the case with imperfect than perfect commitment, which contradicts our premise. Thus, savings will be larger in the case where there is imperfect commitment than when there is full commitment.

Let us now compare savings in non-marital fertility when income sharing increases such that we compare low income sharing at $\underline{\beta}$ with higher income sharing at β, where $\underline{\beta} > \beta$ (i.e., each partner retains a higher share of their own income). In both cases, savings are divided using the δ sharing rule. Defining consumption as c^d_{2i} and c^d_{2j} when income sharing is higher and $\underline{c^d_{2i}}$ and $\underline{c^d_{2j}}$ when income sharing is lower, we can argue that the ratio of marginal returns to savings with high versus low income sharing will always be less than the ratio of marginal costs of investing in τ_j in both cases since

$$\frac{\delta u'(c^d_{2i}) + (1-\delta)u'(c^d_{2j})}{\delta u'(\underline{c^d_{2i}}) + (1-\delta)u'(\underline{c^d_{2j}})} < \frac{(1-\beta)u'(c^d_{2i}) + \beta u'(c^d_{2j})}{(1-\underline{\beta})u'(\underline{c^d_{2i}}) + \underline{\beta} u'(\underline{c^d_{2j}})}.$$

Given this, if the optimal savings with more income sharing was above that with less income sharing, it must also be true that the investment in child quality by the high income partner must be lower when non-marital fertility has higher income sharing since the marginal cost will be higher in this case. These combined imply that $c^d_{2j} > \underline{c^d_{2j}}$. By a similar argument as in the proof of the previous proposition, it must also be that $\underline{c^d_{2i}} > c^d_{2i}$. Combining these, for δ low enough or for $u''' < 0$, returns to savings would be larger in marriage than in non-marital fertility, which would imply that the optimal savings cannot be smaller with less income sharing. Thus, savings are decreasing in income sharing.

A.6 Extensions

Alternative decision-making Our model assumes collective decision-making, but the result of joint savings increasing specialization would carry through with a non-cooperative model where each partner picks individually the amount of investment they wish to make in the public good. Joint savings would decrease the differential in marginal utilities of consumption between women and men in the second period, thus bringing investments closer to the efficient Ω-driven ratio. In this case, one can think of joint savings as lessening the "public goods' problem" of specialized investment. As we earlier discussed, our model is also robust to collective decision making with unequal weights, as long as the weights are such that consumption is shared more equally in marriage than in divorce.

Linear utility If we assume that a couple makes investment decisions jointly, like in our main model, for joint utility to fall with imperfect commitment, we rely on the concavity of the utility function. Since our model emphasizes uncertainty, it is natural to include risk aversion in the model. However, we could alter our model to one where consumption is valued linearly as long as investment decisions were taken individually, as stated above. With linear utility, the role of joint savings would be to reduce the probability that a man would want to divorce, and thus decrease the marginal cost of investments to the woman by shifting weights to a scenario where they absorb less of the cost.

Other sources of heterogeneity In addition to selection on assets, higher earning couples will be more likely to choose marriage, as would, for example, couples who had a Q function that yielded higher utility from public goods, e.g., children. But note, one key insight of our model is that this relationship between marriage and public good provision like children may not only be selection, but may be a causal effect of marriage. In our model, couples who choose marriage will have more specialization and higher public goods than that same couple would have had counterfactually if they were restricted to a non-marital relationship.

Utility cost of divorce Also, in the model above, the utility a couple obtains from household public goods is the same within and outside of a relationship. If we assume instead that the enjoyment that a couple derives from public goods is reduced when divorced or separated, we generate some interesting additional insights. Formally, let us assume that the utility from public goods becomes ηQ, where $\eta < 1$ when a couple is separated. This will now shift the divorce threshold as the husband will be less keen on divorcing than before since he will lose public goods upon divorce. Thus, even with $\phi < 0$, couples will be willing to remain together. Furthermore, the threshold of ϕ that will determine divorce will depend on Q.

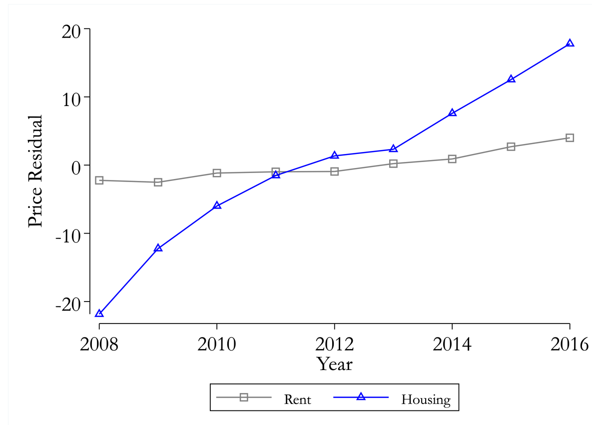
In this context, if a couple has access to a joint savings technology, they will have higher household public goods, which will raise the cost of divorce. This lower probability of divorce influences investment in return through two channels: it makes specialization more likely since the couple will be with a higher probability in the "married state" where marginal costs of investing for the lower earning partner are lower; it can also decreases specialization since the lower earning partner will have a lower incentive to invest as to decrease the probability of divorce. As long as the second effect does not undo the first, we will have even lower costs of divorce. These couples would thus have higher relationship stability than those without access to the commitment technology.

Marriage timing Another potential simplification in our model is that individuals marry in the first period as we abstract from marriage timing. To explore this, let us imagine now that individuals live for 3 periods. Individuals can either marry in the first or the second period. They can only have one such event in their life. They all receive the love shock after the second period. Those who marry early can enjoy the public goods of marriage for an extra period. For individuals with little assets, this change will be irrelevant. They will marry in the first period (if at all) and will not use the commitment technology. But for couples with more assets, there will be an advantage to delay marriage as to either gain access to the commitment technology or to increase the amount of savings that can be placed in the commitment vehicle if the benefits of adding or increasing commitment to the relationship compensates for the loss of one period of marriage. Thus, individuals who have higher endowments would be more likely to delay marriage since this allows them to save larger amounts in the joint savings vehicle, thereby strengthening further the relationship. Poorer individuals would see less benefits to delaying marriage since they would not be able to improve commitment in that fashion. In that world, wealthier individuals will choose marriage, but delay it, while lower asset individuals will engage in early non-marital fertility. This matches the fact that there has recently been a crossover in the US between age at first birth and age at first marriage, with people having children younger on average (due to non-marital fertility) despite marrying later (Arroyo et al., 2012).

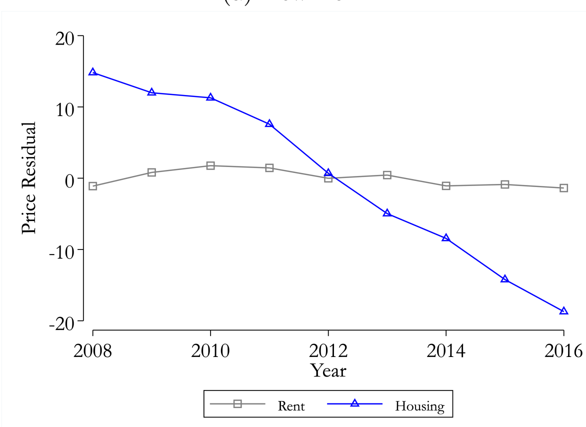
B Appendix Tables and Figures

Figure B.1: Comparison of rental and housing price index residuals by state

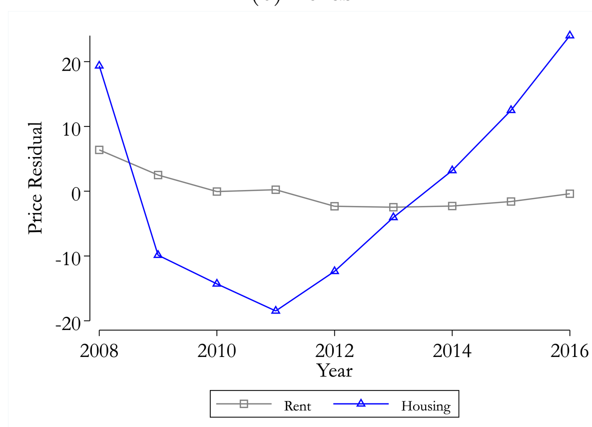
(a) New York



(b) Texas



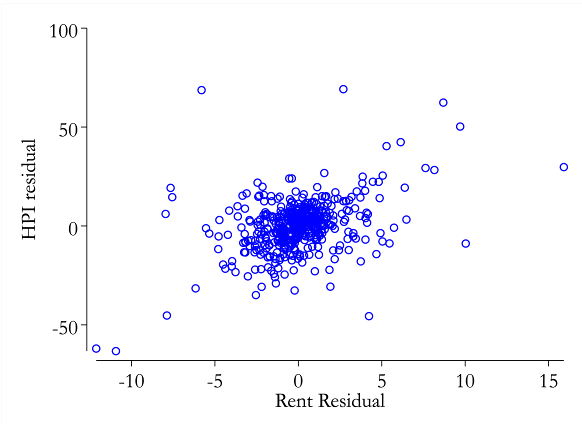
(c) Illinois



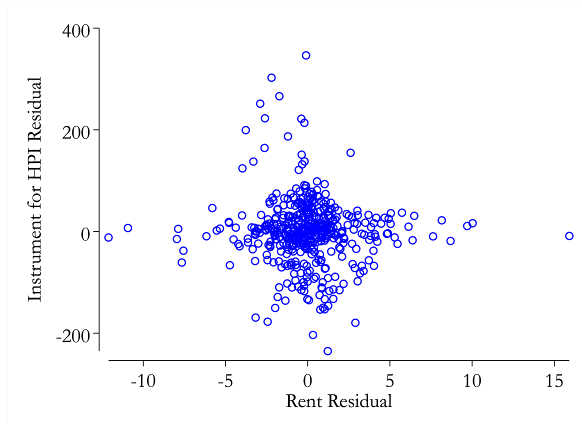
(d) Florida

Notes: Housing price index from the Federal Housing Finance Agency based on purchase-only data. Rental price index from the Bureau of Economic Analysis. Both series represent the residuals of the data against year fixed effects and state fixed effects.

Figure B.2: Comparison of rental and HPI residuals / HPI instrument across all states and years



(a) HPI vs. Rent Residuals



(b) HPI Instrument vs. Rent Residuals

Notes: Housing price index from the Federal Housing Finance Agency based on purchase-only data. Instrument is constructed by taking the pre-period volatility coefficient, sigma, and multiplying it by the leave-one-out national price index. Rental price index from the Bureau of Economic Analysis. Both series represent the residuals of the data against year fixed effects and state fixed effects.

Table B.1: Relationship between property regime and female − male working behavior

Dependent variable:	Usual hours worked (1)	Worked last year (2)
Female × Comm. Prop.	-1.357***	-0.043***
	(0.464)	(0.009)
Female	-12.35***	-0.160***
	(0.201)	(0.003)
Comm. Prop.	0.090	0.005
	(0.687)	(0.005)
Constant	43.60***	1.019***
	(0.388)	(0.010)
Observations	4,969,945	4,968,091
R-Squared	0.166	0.121

Notes: Data uses all couples in the 2008-2014 ACS married within the last eighteen years. Controls for age, educational category, and race fixed effects included. Arizona, California, Idaho, Louisiana, Nevada, New Mexico, Texas, Washington, and Wisconsin are community property states, while the remaining stats are equitable division.

Table B.2: Relationship between house prices at marriage and individual's years of education

	(1)	(2)	(3)	(4)
House Price Index	0.113*	0.110*	0.573**	0.572**
	(0.059)	(0.059)	(0.224)	(0.222)
Year of Survey HPI	No	Yes	No	Yes
Additional Controls	No	No	No	No
Observations	2,800,101	2,800,101	2,520,831	2,520,831

Notes: Data uses individuals in the 2008-2014 ACS married within the last eighteen years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of marriage, divided by 100, with the last two columns instrumented for with $-\widehat{\text{HPI}}$, as defined in equation 3. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

Table B.3: Relationship between house prices at age 25 and total work hours of a couple

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
House Price Index	0.172	0.154	0.223	1.442	1.425	1.575
	(0.333)	(0.333)	(0.282)	(1.455)	(1.469)	(1.256)
Year of Survey HPI	No	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes

Notes: Data uses all couples in the 2008-2014 ACS who turned 18 within the last eighteen years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency at age 25, divided by 100, with the last three columns instrumented for with $-\widehat{\text{HPI}}$, as defined in equation 3. Fixed effects for birth cohort, current year, and state are included in all specifications. Standard errors are clustered at the state level. N=1,733,512 for the first three columns and N=1,535,889 for the last three.

Table B.4: Relationship between house price at age 25 and specialization

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Labor Supply			
			Worked Last Year			
House Price Index	-0.004	-0.004	-0.003	-0.012**	-0.013**	-0.017**
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.007)
HPI × female	0.013***	0.013***	0.011***	0.019***	0.019***	0.017***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
			Usual Hours Worked			
House Price Index	-0.418***	-0.424***	-0.409***	0.105	0.101	-0.239
	(0.127)	(0.126)	(0.117)	(0.546)	(0.553)	(0.570)
HPI × female	1.335***	1.335***	1.186***	1.518***	1.517***	1.399***
	(0.258)	(0.258)	(0.249)	(0.316)	(0.316)	(0.293)
			Panel B: Wages			
			Wage (level)			
House Price Index	-3680***	-3728***	-3722***	-3594	-3620	-6191***
	(809)	(799)	(739)	(2428)	(2388)	(2128)
HPI × female	7858***	7859***	7063***	8337***	8330***	7672***
	(992)	(992)	(962)	(1003)	(1007)	(939)
			Log hourly wage			
House Price Index	-0.018*	-0.020*	-0.019***	0.063**	0.062**	-0.002
	(0.010)	(0.010)	(0.006)	(0.030)	(0.030)	(0.013)
HPI × female	0.090***	0.090***	0.067***	0.089***	0.089***	0.069***
	(0.012)	(0.012)	(0.010)	(0.014)	(0.014)	(0.012)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes

Notes: Data uses individuals in the 2008-2014 ACS who married within the last eighteen years. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year and state of current residence divided by 100. Fixed effects for the year of marriage, current year, and state are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level. For OLS, N=3,702,212 for all outcomes except log hourly wage where N=2,900,523. For IV, N=3,330,278 for all outcomes except log hourly wage where N=2,612,991.

Table B.5: Relationship between house prices at age 25 and specialization: robustness

	Worked Last Year		Usual Hours Worked	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
	Renters			
House Price Index	-0.001	-0.008	0.039	-0.276
	(0.003)	(0.010)	(0.144)	(0.643)
HPI × female	-0.006	-0.002	-0.326	-0.024
	(0.004)	(0.006)	(0.205)	(0.307)
N	1,280,958	1,197,915	1,280,958	1,197,915
	Never married individuals			
House Price Index	0.004	-0.008	0.360*	-0.793*
	(0.004)	(0.009)	(0.188)	(0.455)
HPI × female	-0.017***	-0.017***	-1.178***	-1.129***
	(0.003)	(0.004)	(0.197)	(0.219)
N	1,540,216	1,428,561	1,540,216	1,428,561
	Using state of residence			
House Price Index	-0.011***	-0.026***	-0.780***	-1.541**
	(0.003)	(0.009)	(0.175)	(0.576)
HPI × female	0.020***	0.032***	1.695***	2.476***
	(0.005)	(0.007)	(0.312)	(0.410)
N	4,609,404	4,362,719	4,609,404	4,362,719
	Without 2008-2011			
House Price Index	-0.007*	-0.007	-0.828***	-0.998***
	(0.004)	(0.005)	(0.216)	(0.369)
HPI × female	0.015**	0.019**	1.514***	1.830***
	(0.006)	(0.008)	(0.379)	(0.488)
N	2,953,635	2,592,470	2,953,635	2,592,470
Additional Controls	No	Yes	No	Yes

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 within the last eighteen years. House Price Index represents state housing prices from the Federal Housing Finance Agency at age 25 , divided by 100. Fixed effects for birth cohort, current year, and state of birth are included in all specifications. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level. First panel only includes renters. Second panel only includes never married individuals. Third panel uses the state of residence instead of state of birth. Fourth panel excludes the years of the Financial Crisis.

Table B.6: Relationship between house prices at age 25 and time use (in minutes per day, <43 years old)

	Dependent variable, time in:					
	Work		Home Production		Leisure	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: OLS					
House Price Index	-1.503	0.0864	-1.143	-1.713	0.469	-0.605
	(6.813)	(6.729)	(5.336)	(5.472)	(7.604)	(7.465)
HPI × female	18.31***	16.28**	-18.03***	-17.25***	-0.948	0.328
	(6.733)	(6.321)	(4.154)	(3.869)	(4.803)	(4.712)
Observations	55801	55801	55801	55801	55801	55801
R-Squared	0.231	0.240	0.120	0.122	0.179	0.183
	Panel B: IV					
House Price Index	-0.0762	0.366	-54.99*	-55.14*	56.78**	56.41**
	(14.34)	(13.52)	(30.56)	(29.59)	(27.14)	(27.76)
HPI × female	22.41***	19.97**	-21.95***	-20.72***	-0.661	0.593
	(8.185)	(8.034)	(5.383)	(5.144)	(5.595)	(5.649)
Observations	42627	42627	42627	42627	42627	42627
R-Squared	0.227	0.236	0.115	0.119	0.176	0.179
Year of Survey HPI	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes	No	Yes

Notes: Data uses American Time Use Survey from 2003 to 2019, for individuals who turned 25 no more than 18 years ago. Work is both work and work related travel. Home production includes childcare, housework, and errands, and all related travel. Leisure includes recreation, sleep, and volunteer and educational time. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of turning 25, divided by 100. Fixed effects for the year of birth, current year, and state are included in all specifications, as well as fixed effects for day of the week and holidays. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level.

Table B.7: Relationship between house prices at age 25 and time spent on physical space

	Dependent variable: Time on physical space			
	Younger than 35		Younger than 43	
	(1)	(2)	(3)	(4)
	Panel A: OLS			
House Price Index	-1.424	-1.581	-1.913	-2.037
	(2.111)	(2.140)	(2.073)	(2.097)
HPI × female	0.640	0.783	0.819	0.936
	(1.438)	(1.441)	(1.261)	(1.271)
Observations	33015	33015	55801	55801
R-Squared	0.0254	0.0262	0.0257	0.0262
	Panel B: IV			
House Price Index	-2.863	-2.927	-3.518	-3.579
	(4.228)	(4.087)	(4.320)	(4.204)
HPI × female	0.484	0.624	-0.132	-0.016
	(1.933)	(1.926)	(1.496)	(1.495)
Observations	30879	30879	42627	42627
R-Squared	0.0248	0.0256	0.0234	0.0241
Additional Controls.	No	Yes	No	Yes

Notes: Data uses American Time Use Survey from 2003 to 2019, for individuals who either turned 25 no more than 18 years ago or no more than 10 years ago. Physical space upkeep includes interior and exterior maintenance and lawn and garden care. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year of turning 25, divided by 100. Fixed effects for the year of birth, current year, and state are included in all specifications, as are controls for year-of-survey HPI, and fixed effects for day of the week and holidays. Additional controls include a linear control for age and dummies for 4 educational categories. Standard errors are clustered at the state level.