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COLLATERALIZED MARRIAGE

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ABSTRACT

We develop a model of the household where investments in public goods can be made at the cost of future earnings. If couples cannot commit ex ante to a sufficiently equal post-divorce allocation, specialization and public goods' creation will be sub-optimal. However, investing in joint assets, which the marriage contract specifies are to be divided in the case of divorce, can reduce this problem by offering insurance to the lower earning partner. Our model demonstrates that access to this "collateralized" version of the contract will lead to more household specialization, more public goods, and a higher value of marriage. Empirically, we show that quasi-exogenous variation in access to collateralization leads to more specialization, and that wealth has become a more important determinant of marriage in response to policies that have made marriage and cohabitation more similar. Wealthy individuals can thus access a more advantageous marriage contract, which has important policy implications.

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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 higher for wealthy individuals, even after controlling for other factors like education, income, and race (Lafortune and Low, 2017), 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."[1] In this paper, we offer theoretical and empirical evidence that wealth serves as "collateral" to strengthen the marriage contract, and that it is this stronger "collateralized" contract that has retained value as marriage has otherwise eroded.

In particular, because the marriage contract uniquely specifies that joint assets are to be divided in the case of divorce, we suggest that wealth allows a couple to commit to more equal consumption sharing in case their union dissolves. This provides protection to a partner who specializes in home production, and would therefore be left with lower consumption upon divorce due to a lower stock of human capital. Our model demonstrates that couples with "collateralized" marriages will thus be more able to choose an optimal level of specialization and public goods, and receive more value from marriage. This has the important policy implication that wealth inequality may directly lead to inequality in family structure, child investments, and other important outcomes, and that this problem has worsened over time. We show empirical evidence that quasi-exogenous variation in access to collateralization is linked to higher specialization, and that asset ownership has become a more important determinant of marriage as marriage and cohabitation have become otherwise more similar.

It has long been thought that one of the advantages of marriage may be in the ability to specialize (Pollak, 2011). Although more and more individuals are matching assortatively on wealth, household specialization still takes place, as evidenced by the persistent gender wage 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).[2] This specialization produces benefits to the couple through the creation of household public goods at a lower opportunity cost, but it creates risk to the partner who forgoes investments in her own human capital. Children are one example of household public goods, but other examples abound: location choices for one partner's career, caring for a sick spouse, and performing home management each present opportunities to create shared value in the household, while potentially creating future private costs.

Marriage, by providing a contract, should provide the investing party with some assurances that both the gains and future costs will be shared, even if the relationship dissolves. In this spirit, some recent literature has speculated that marriage has retained value for those who wish to commit to invest in public goods, such as children (Lundberg and Pollak, 2015). We suggest that rather than heterogeneity over preferences for investment, there may instead be heterogeneity in contract access. As various policy changes have weakened the relative commitment value of marriage, individuals without wealth may not be able to form a sufficiently strong contract to make these large investments, therefore limiting the value of marriage in the first place.

[1] "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.

[2] Recent literature has suggested specialization may persist due to a convex return to hours in the labor market (Cortés and Pan, 2019; Gicheva, 2013; Kuhn and Lozano, 2008; Goldin, 2014)

On the other hand, those who are able to create stronger marriage contracts through the use of collateral, which requires wealth, will be able to benefit more from specialization, and thus have higher marriage rates.

This is of crucial importance because there is currently an important 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 (Kuhn et al., 2019; Saez and Zucman, 2016; Alvaredo et al., 2017; Jakobsen et al., 2020). The racial wealth gap is much larger than the racial income gap, and there is substantial racial stratification in marriage rates as well. If wealth determines access to a more advantageous marriage contract, which allows for greater specialization, it will also affect human capital investments in the next generation. This channel has not been previously explored, and could play a substantial role in the inter-generational transmission of socioeconomic status.

To explore these issues, we specify a model where households value both private consumption and a household public good. The latter requires time investments from each spouses, which come at the expense of human capital in the next period.[3] As the two partners' costs of investment are not equal, they will optimally choose some specialization as long as they have full inter-temporal commitment to future income sharing. However, marriage consists of two periods: a certain period, during which a time investment decision is made, and a stochastic period, where a marital partnership can dissolve. If a couple cannot commit to share income in the second period, they will initially choose a sub-optimal division of labor, resulting in lower public goods' creation and a lower value of marriage.

If the couple is able to collateralize the marriage through a savings device that is shared more favorably to the lower income partner than income upon divorce, the couple will be able to offer some "divorce insurance" to the partner specializing in home production. This will lead the couple to save in this vehicle exclusively,[4] and to greater specialization when this commitment device is available. The couple's more optimal specialization will be tied to greater public goods' investment and marital stability, and thus naturally lead to a higher ex-ante value of marriage. As a result, when we allow couples to select between marriage and cohabitation (which does not offer access to the commitment technology), couples with higher wealth who will have more ability to generate a joint pool of savings to be divided will select marriage at greater rates.

Ideally, to empirically test the model, we would want variation in two things. First, the contracting environment in terms of how assets are divided, and second, the level of baseline assets a couple has. The former would allow us to test whether asset division more favorable to the lower-earning partner enables specialization, and the latter would allow us to test whether, as a result, higher asset individuals receive more value from marriage.

In regards to the contracting environment, while there is statutory variation in how assets are divided in divorce in the US, these state-level policies have not changed over time. Nonetheless, we do observe that in community property states, where assets are divided more favorably to the lower-earning partner, there are dramatically higher rates of specialization. In order to test that the division of assets matters, we turn to variation in the ability to access "high commitment" assets. Marital homes are particularly

[3] In this way, our model is unique from literature that has framed women's labor supply as reflecting bargaining power to spend time on leisure (e.g., Chiappori et al., 2002; Voena, 2015; and Chiappori and Oreffice, 2008) by emphasizing the productive value of time away from work for creating household public goods.

[4] 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.

likely to be assigned in a way that favors the lower earning partner by divorce courts, in addition to being highly observable and illiquid. Our model provides the implication that if there is a threshold level of wealth required to access the commitment device, i.e., a down payment for homes, lowering this threshold will result in more specialization and public goods' provision. Fluctuation in housing prices thus provides local, time-varying access to the commitment technology.

To examine the selection implications of our model, we have already noted that indeed wealth and marriage are highly correlated. Our model then provides the related, empirically testable, prediction that as marriage and cohabitation become contractually more and more similar, a greater correlation between financial assets and marriage will arise.

Our empirical section is thus divided into two sections. First, we test for whether collateral in marriage matters for specialization using variation in local housing prices, and thus homeownership access, at the time of marriage. Second, we test whether assets play a role in selection into marriage by showing the relationship between assets and marriage intensifies as policy changes weakened marriage and strengthened cohabitation in domains other than asset division.

For the first exercise, using data from the American Community Survey and the Federal Housing Finance Agency, we assign local housing prices in the year of marriage to individuals. Controlling for other local and time-varying factors, we show that idiosyncratic variation in housing prices at the time of marriage creates persistent variation in homeownership that can be used for identification. We then show that lower housing prices at the time of marriage, and thus higher homeownership, is tied to greater household specialization, with men working more and women working less when they were married in a low-housing-price environment. Wages follow the same pattern, with men's earnings responding positively to easier homeownership while women's decline. 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. As a placebo check, we find that neither unemployment at the time of marriage nor housing prices three years after marriage have any effect. Moreover, the effect is absent for renters, and stronger for the college-educated, who may have more at risk from lost human capital due to specialization. We find the results extremely robust to a variety of additional checks: they do not appear to be driven by migration or the 2008 housing crisis, and are robust to focusing on finer MSA-level price variation. Finally, to eliminate concerns that correlated economic factors may be driving our results, we utilize the strategy of Palmer (2015) to instrument for housing prices, and find this strengthens our results.

We then test how the relationship between assets and marriage has changed over time, using panel data on assets and marriage from the Panel Study of Income Dynamics and Survey on Income and Program Participation, and state-year variation in two policies that made marriage and cohabitation contractually more similar. First, the introduction of unilateral divorce, which made the intertemporal 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 wealth 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 cohabitation. In addition to confirming our model, this suggests an increasing role for wealth in determining who can access the benefits of marriage for supporting optimal specialization and child investment.

Our work relates to several literatures. The fact that higher public good provision are observed in marriage compared to cohabitation has been discussed previously. 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. This relates to literature showing that time and money investments cannot be substituted in producing child human capital (Del Boca et al., 2013) and that returns to intensive parenting may be increasing over time (Doepke and Zilibotti, 2017; Ramey and Ramey, 2010). Importantly, our work suggests the contractual basis needed to insure intensive parenting investments may not be equally available to all.

Accordingly, our work also relates to literature identifying a gradient in the United States by socioeconomic status in rates of marriage versus cohabitation (Lundberg et al., 2016). Our research suggests that wealth inequality, rather than tastes, could be a potentially important driver since wealthy people can access a more advantageous marriage contract. This is also consistent with findings in sociology literature of a relationship between wealth and marriage (Schneider, 2011). Our research suggests a channel through which this inequality could persist across generations, since those with more wealth are able to elicit higher investments in children, which will then lead to higher human capital in the next generation.

By introducing the interaction between assets and the marital contract—collateralization—we contribute to literature on the impact of marital and non-marital contracting for behavior. 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), and other protections for cohabitants in other countries (Chiappori et al., 2017b; Chigavazira et al., 2019). Many papers have also examined the impact of increased ease of divorce,[5] including the switch to unilateral consent (Friedberg, 1998; Ananat and Michaels, 2008; Holden and Smock, 1991; Gruber, 2004; Cáceres-Delpiano and Giolito, 2008; Wolfers, 2006).[6] This legal change has been shown to erode the commitment value of marriage, in response to which women increased their human capital accumulation (Bronson, 2014) and labor supply (Stevenson, 2008; Fernandez and Wong, 2011) while decreasing their "marriage-specific capital" (Stevenson, 2007).[7] 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). Reynoso (2017) suggests that due to decreased specialization, higher divorce will also be linked to an increase in assortative mating. Fernandez and Wong (2017) demonstrates that unilateral consent regimes are likely to decrease women's welfare, due to men's higher earnings. Voena (2015) shows that unilateral divorce has differential impact on existing marriages depending on the property division regime, suggesting that women have increased bargaining power when they are guaranteed higher divorce settlements.[8] We introduce the idea that assets may be

[5] Mechoulan (2005) summarizes the theoretical approaches to divorce in the literature.

[6] Brown et al. (2015) by contrast examines different levels of mandatory child support upon divorce.

[7] Interestingly, Stevenson (2007) additionally shows no decrease in homeownership on average, which is consistent with our model because homeownership is not so much "marriage-specific capital," but rather partially a commitment device that will be sought by those who contract marriage, even with easier divorce.

[8] Note we abstract away from different property division regimes, as in our theoretical analysis we only need that joint assets are divided more evenly than income, and in our empirical analysis we focus on homes, which are likely to be divided equally no matter the regime.

used *ex ante* by couples to induce greater investments in household public goods, thus raising the value of marriage to both parties.

Finally, our paper relates to work relating assets to commitment devices in other contexts. Previous literature has shown the importance of collateral in borrowing contracts, helping to overcome both moral hazard and adverse selection, and thus potentially reducing credit rationing (see Steijvers and Voordeckers, 2009, for a summary of literature). However, there has been less focus on the role of collateral in increasing commitment in contracts between two parties of equal standing, perhaps because in few contracts is there formal legal enforcement of collateral division in case the joint venture dissolves. Our work suggests that contracts that allow for collateral to be placed in a pool for division in case of partnership dissolution, as the marriage contract does, could potentially allow for increased economic efficiency. Broadly, our model suggests that when individuals are unable to commit perfectly, dynamic inefficiencies arise, as has been discussed by Mazzocco (2007) and Chiappori and Mazzocco (2017). What is novel is that we suggest the use of joint assets may diminish these inefficiencies. Previously, the role of financial resources in relationship dissolution has been discussed by Brinig (1990), who examines diamond engagement rings, Ambrus et al. (2010), who look at mehr in Bangladesh, and Bayot and Voena (2015) who look at property division and prenuptial contracts in Italy.

There is more limited literature on the topic of homeownership and marriage. 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. We contribute to this literature by discussing for the first time how homeownership may serve to "collateralize" the marriage contract, thus increasing the wedge between the attractiveness of marriage and cohabitation for those able to purchase homes.[9]

The rest of this paper is organized as follows. We present the model and its predictions in Section 2. 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 3, and demonstrate that the role of assets in determining selection into marriage has increased as marriage and cohabitation have become more similar in Section 4. Section 5 concludes.

2 Model

We present a standard model of marriage with a public good in which both parents can invest, at a cost to their future earning potential. We initially set up a cooperative model, where decisions are made efficiently with full commitment, but then introduce the fact that individuals cannot commit to the resource allocation in divorce, which leads to inefficient reduction in household specialization and investment in public goods.

[9]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.

We then 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 goods' creation, and in turn raises the value of marriage.

2.1 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.[10]

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. 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.[11] Note that it would be easy to replace the unequal earnings capacity with an unequal return to investing in public goods. 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 advantage in market work.

In the first period, couples earn only fraction μ of their Ω, representing realistic income growth over time. However, they also have access to assets, 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 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 other than through its impact on consumption, Pareto separation occurs whenever $\phi < 0$.

Individuals could receive different consumption when divorced than when married, so second-period

[10] Our empirical estimations will follow the statistics that women tend to be the lower earning partners on average. In addition to other forces, this could represent the fact that one of the main public good we will think of are children and 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. In line with this, the literature shows that mothers pay a higher price in wages for having a child than their partners (e.g Adda et al., 2017; Kleven et al., 2017; Bronson et al., 2017; Angelov et al., 2016).

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

consumption utility will be given by $E(u(c_{2k})) = (1-p)u(c_{2k}^m) + pu(c_{2k}^d)$, where $p = P(\phi \leq 0)$ and c_{2k}^m denotes the consumption of individual k when married and c_{2k}^d denotes the consumption when divorced. Individual k's 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.[12]

2.2 Couple's problem

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.[13] Then, the couple's problem can be summarized as:

$$\max_{\tau_i, \tau_j} \quad u(c_{1i}) + u(c_{1j}) + E(u(c_{2i})) + E(u(c_{2j})) + 2(1-p)E(\phi|\phi > 0) + 4Q(\tau_i, \tau_j, s) \tag{1}$$

subject to the following constraints:

$$c_{1i} + c_{1j} = \mu\Omega_i + \mu\Omega_j + A - s$$

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

$$\tau_i, \tau_j \leq 1$$

When there is an interior solution (as long as A is sufficiently small relative to Ω_i and Ω_j) investments in the public good will be made until:

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

because investing in τ increases child quality while decreasing second period consumption through the budget constraint. Note this condition simply requires that the marginal benefit of investing in public goods in terms of utility derived from them be equated to the expected marginal cost which is born in the second period.

2.2.1 Full commitment

To first establish the full commitment benchmark, we assume individuals can reliably commit to how to share resources when divorced. Since they behave cooperatively (or collectively with equal Pareto weights), the optimum will be equal sharing of resources in all periods and states of the world such that consumption of both partners in the first period will be given by $c_1 \equiv \frac{1}{2} * (\mu\Omega_i + \mu\Omega_j + A - s)$ and consumption of both partners in either marriage or separation in the second period will be given by $c_2 \equiv \frac{1}{2} * (\Omega_i(1-\tau_i) + \Omega_j(1-\tau_j) + s(1+r))$.

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

[13] 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 2.6.

Using the fact that we will have equal sharing and perfect commitment, and that divorce does not affect income, second period consumption will be the same no matter the love shock received.

Thus, savings decisions will be made such that:

$$u'(c_1) = u'(c_2)(1+r).$$

And, to solve for optimal public goods' investments, we can collapse the left-hand side of equation 2 as follows:

$$\begin{aligned}
-\frac{\partial\left[E(u_{2i})+E(u_{2j})\right]}{\partial\tau_k} =& -(1-p)\left(\frac{\partial u(c^m_{2k})}{\partial\tau_k}+\frac{\partial u(c^m_{2k'})}{\partial\tau_k}\right)+p\left(\frac{\partial u(c^d_{2k})}{\partial\tau_k}+\frac{\partial u(c^d_{2k'})}{\partial\tau_k}\right)\\
=&(1-p)(\frac{1}{2}\Omega_k u'(c_2)+\frac{1}{2}\Omega_k u'(c_2))+p(\frac{1}{2}\Omega_k u'(c_2)+\frac{1}{2}\Omega_k u'(c_2))\\
=&\Omega_k u'(c_2).
\end{aligned}$$

Yielding the following condition for optimal investment of either partner:

$$\Omega_k u'(c_2) = 4\frac{\partial Q}{\partial\tau_k}.$$

As such, the optimal household specialization will be proportional to the ratio of endowments between partners:

$$\frac{\Omega_i}{\Omega_j} = \frac{\frac{\partial Q}{\partial\tau_i}}{\frac{\partial Q}{\partial\tau_j}}.$$

That is, the partner with the higher earning capacity will spend more time investing in market work, while the partner with the lower earning capacity will spend more time investing in public good production, but both will consume equally.

Note that mutual consent to divorce assists in the implementation of the full commitment equilibrium. This is because if the shock is such that the richer partner wishes to divorce while his partner does not, he would need to offer her the same consumption level she would receive in marriage in order to obtain her consent to do so. However, it is not sufficient since once both partners want to divorce, mutual consent does not guarantee that the pre-determined division of resources would be maintained. However, if negative love shocks of that magnitude are rare, a mutual consent regime can be close to full commitment.

2.2.2 Imperfect commitment

Let us now assume that 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 $1-\beta$ 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.

Second period consumption 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

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

This will imply that some men will wish to divorce when their partner will not want to, since men are assumed to be the higher earning partner. Specifically, they will want to divorce when $u(c_2) + \phi < u(c_{2j}^d)$ which will occur when $\phi < \bar{\phi} = u(c_{2j}^d) - u(c_2) > 0$. Because the husband has the "right" to seek divorce, if a wife wishes to remain married, she will need to offer her partner the utility he would obtain in divorce. We call this state "renegotiation," and it occurs whenever $0 < \phi < \bar{\phi}$. Divorce will continue to occur only when $\phi < 0$.

The couple's problem remains as in (1), but 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 expectation in the second period of (1) is now a weighted average of three scenarios:

$$E(u(c_{2i})) + E(u(c_{2j})) = \underbrace{(1-\bar{p})(u(c_{2i}^m) + u(c_{2j}^m))}_{\text{marriage}} + \underbrace{\int_0^{\bar{\phi}} (u(c'_{2i}) + u(c'_{2j}))l(\phi)d\phi}_{\text{renegotiation}} + \underbrace{p(u(c_{2i}^d) + u(c_{2j}^d))}_{\text{divorce}} \quad (3)$$

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

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.

Proposition 1 *Households will specialize less and will save less with imperfect commitment. Public goods' creation will be lower. The less income sharing there is upon divorce, the less specialization there will be.*

Proof. See Appendix A. ■

The key driver of this result is that specialization worsens the commitment problem in the second period, because it reduces the lower-earning partner's guaranteed share of income. Thus, her investment carries two additional costs: first, it further reduces consumption of the partner whose marginal utility of consumption is higher, making it much more costly than if the burden could be shared efficiently, and secondly, it increases his temptation to divorce since she brings less to the household in the second period, which shifts weight toward the scenario where specialization is more costly. Thus, specialization carries an efficiency cost when there is imperfect commitment, and couples will specialize less than is optimal, and therefore also produce a lower level of household public goods.

2.3 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. 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.[14] Under perfect commitment, this technology would have no effect on decisions. However, under imperfect commitment, we will show that this alters public goods' investment decisions.

To allow for the fact that there is some choice as to whether to intermingle pre-existing assets, such as by opening a joint marital account or purchasing a joint home, we now 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.[15]

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 goods' investment. This gives rise to the following proposition:

Proposition 2 *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* $\alpha < \bar{\alpha}(s^*)$

Proof. 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

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

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. ■

Proposition 3 *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*

[14] 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.

[15] 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.

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:

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

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, the lower-earning partner's consumption would increase while the higher earning partner's would decrease. It would also make renegotiation less probable, making 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 fully specialize in home production. 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 goods' production.[16]

2.4 Selection into marriage

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

We model cohabitation as a union that has potentially less income sharing upon separation than marriage, and that does not offer commitment to share assets.[17] This is meant to match the reality of how cohabitation is treated in the United States. In this context, cohabitation traditionally offered no protection to partners

[16] 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.

[17] 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.

at the moment of separation. Over time income sharing post-separation has been introduced, in the form of non-marital child support enforcement.[18] However, a similar change has not happened in the case of assets. In cohabitation, assets are owned by whoever acquires them, no matter the duration of the relationship.[19] We will thus assume all assets are shared according to $\delta < 1 - \beta$, as in our imperfect commitment case. Our assumption that savings in cohabitation 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.[20]

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 $V_R(A, \Omega_i, \Omega_j)$ 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_m is centered above 0, thus that marriage has higher average fixed costs than cohabitation, and therefore will be preferred by couples who receive sufficiently large benefits from the stronger contract to justify the costs.

Proposition 4 *If there is imperfect commitment in both marriage and cohabitation, but only marriage provides access to the commitment technology, the relative preference for marriage over cohabitation will increase in A for large enough α. Formally,* $\frac{\partial V_M(A,\Omega_i,\Omega_j) - V_C(A,\Omega_i,\Omega_j)}{\partial A} > 0$.

Proof. From the envelope theorem, we know that $\frac{\partial V_R}{\partial A} = u'(c_1) > 0$. As A increases, marriage and cohabitation 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 demonstrates that savings will be larger in marriage than in cohabitation for large enough α, which will mean that first period consumption will be lower in that case. Given that, $\frac{\partial V_M}{\partial A} > \frac{\partial V_C}{\partial A}$. ■

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 cohabitation, joint utility from marriage will increase more quickly in assets than joint utility from cohabitation.

2.5 Empirical implications

Two natural empirical predictions of our model would be that a legal regime that divides assets more favorably to the lower-earning partner would encourage specialization and public good provision, and moreover that couples with more assets should be more likely to marry. Unfortunately, variation in assets are

[18] See Section 4.

[19] 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.

[20] 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.

likely to carry substantial selection effects. And, while states do differ in how marital property is divided, these laws have not changed *over time*, meaning there is no way to separate these differences from state fixed effects. While we can show that stylized facts are consistent with the predictions of our model in these domains, to develop a more dispositive test of our model's validity, we turn to two related implications in our model where we can find quasi-exogenous variation.

First, 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 goods' provision.

Proposition 5 *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.*

Proof. First, since access to the commitment device increases the joint utility of the couple, the maximum marriage fixed cost required for individuals to prefer marriage over cohabitation will be higher when there is access to commitment than when there is not. Also, since better income sharing increases the joint utility, individuals will prefer marriage without access to commitment over cohabitation at equivalent fixed costs. We also know from Proposition 4 that the maximum cost of marriage will rise with assets when α savings are available. We can thus divide the population of couples into 3 different groups (nobody will ever prefer marriage without commitment over cohabitation but not prefer marriage with commitment over cohabitation). Some have assets and a marriage fixed cost such that they will always prefer cohabitation to marriage, irrespective of whether marriage provides access to the commitment device or not. A fall in λ will have no effect on them. Some have assets and a marriage fixed cost such that they will always prefer marriage, irrespective of whether marriage provides access to the commitment device or not. For these individuals, a fall in λ will not impact selection into marriage but will lead some couples who did not have access to the commitment technology to now be able to take advantage of it, leading them to have more specialization, higher public good provisions and higher relationship stability as shown in Proposition 3. Finally, there are a group of couples for whom the fixed cost and asset level are such that they will prefer marrying to cohabiting only when marriage provides access to the commitment device. For those couples, a fall in λ will cause them to select into marriage. These couples will thus be able to 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 goods provision and specialization. *Conditional on marriage* specialization and public goods' provision should also increase, unless the proportion of new couples selecting into marriage is very large, and their lower A leads to lower public goods provision and specialization, dominating the effect for existing couples. ■

Second, although variation in asset level by couple is likely to be endogenous, changes in the policy environment substantially impact the way asset holding correlates with marriage. The role of assets in determining marriage selection will be much more important when marriage offers less commitment relative to cohabitation. For example, the introduction of unilateral divorce, which decreased marital commitment, and child support outside of marriage, which increased non-marital commitment, should both raise the importance of assets in determining the value of marriage.

Proposition 6 *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 cohabitation. If there is a level of assets λ required to access the commitment device, this will strengthen this effect.*

Proof. Assume that marriage changes from offering perfect commitment to featuring unilateral divorce. From the proof of Proposition 4, we know that the return to assets in a union can be measured through savings, which captures the marginal utility of first period consumption. Appendix A shows that for α large enough, savings will be larger with imperfect commitment than with perfect commitment. 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 cohabitation 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 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 cohabitation compared to marriage. Thus, the correlation between assets and the probability of marriage will increase as cohabitation becomes more similar to marriage in terms of income sharing. ■

The role of assets in determining marital selection thus grows as marital commitment *not* from assets weakens.

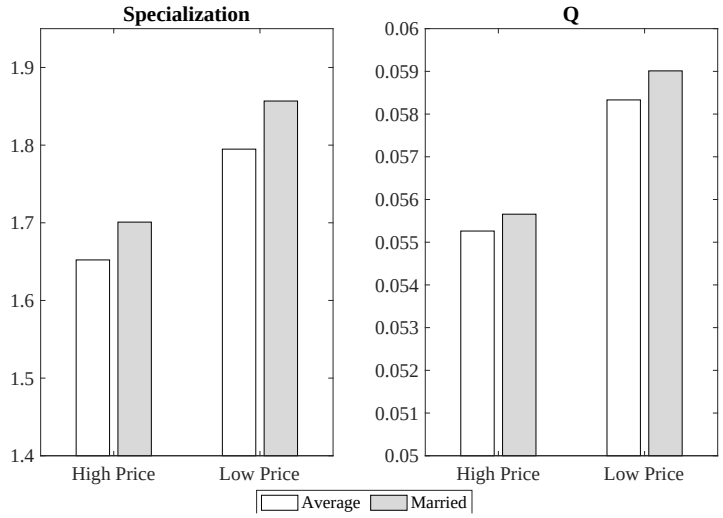
We simulate these two empirical implications using a parameterized version of our model in Figure 1. Panel (a) shows that falling house prices, when a down payment is required to purchase a home, result in increased specialization and public goods' production, including when restricting to married couples. Panel (b) shows that as marriage becomes more similar to cohabitation, 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 cohabitation 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.

2.6 Extensions

The key ingredient for 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.

Figure 1: 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 grey bars restrict to the married population, which also experiences a selection effect, and shows that the result is very similar. Panel (b) simulates the impact of making the marriage and cohabitation contract 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 cohabitation: $\gamma = 0.9$, and then raised to 0.825 and 0.75. Asset division in marriage: $\alpha = 0.3$, in cohabitation: $\delta = 0.1$. Love shock normal(0,2), cost of marriage lognormal(3.8, 2.1). High price $\lambda = 2$, low price $\lambda = 1.2$.

Alternative decision-making Our model assumes collective decision-making, but the result of joint savings increasing specialization would carry through with individual decision-making. 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 the above 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 cohabitation 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. This implies that the couple will have an additional incentive to invest in public goods since, in addition to the factors we highlighted previously, by increasing her investment, they will now reduce the probability of him wanting to re-negotiate the contract or divorce, thus lowering the marginal cost of the investment.

In this context, if a couple has access to a joint savings technology, it will increase the incentives to invest in household public goods, as we discussed above. Since couples with that access have higher household public goods, they will divorce less than those without because this will affect the threshold of ϕ at which couples will find it optimal to separate. We thus obtain the additional theoretical result:

Proposition 7 *If public goods' enjoyment is lower upon divorce, couples who have access to savings that are divided more equally upon divorce will have more stable relationships and less divorce.*

Leisure Unlike Voena (2015) and Chiappori and Oreffice (2008), our model does not feature leisure, and thus we think of reduced labor supply in the first period as primarily indicating higher public goods investment, rather than increased bargaining power. Our results would still go through if we allowed men and women to split their time between labor, leisure, and investment. This is because higher utility in the divorced state (whether through more leisure or more consumption) will nonetheless decrease the wife's marginal cost of investment in public goods, and thus lead to a higher level of investment. Her greater bargaining power in our current model is captured through her higher consumption in the renegotiated state. The couple is willing to extend her this increased bargaining power because of the benefits of increased public goods investment. Thus, the couple would also be willing to absorb greater leisure taken as a result of increased security in the second period, since this security would also increase public good provision and efficient specialization. Our model thus emphasizes the productive value of commitment, in addition to its role in altering bargaining power.[21]

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. The key change that this will introduce in our model is that single individuals could save from the first to the second period. This would allow them to put at risk more of their assets and through that better incentivize public good investment. Thus, individuals who have higher endowments could delay marriage more since this allows them to save larger amounts in the joint savings vehicle, thereby strengthening the relationship more. Poorer individuals would see less benefits to delaying marriage since they would not be able to accumulate large amounts of savings anyway. 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).

3 The Role of Collateral within Marriage

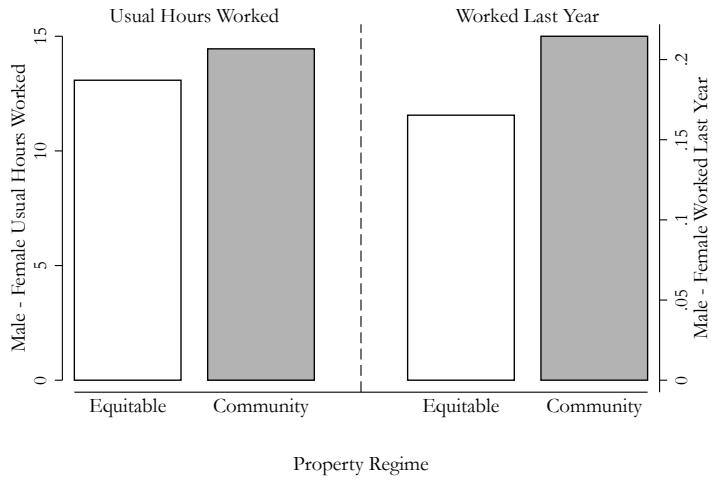
Having shown a model where collateralizing marriage increases labor specialization, household public goods, and relationship stability, we now turn to exploring that relationship empirically. To test Proposition 3 in our model would require exogenous variation in the legal regime in terms of asset division. Unfortunately, while there is statutory variation in property division upon divorce, these laws have not changed over time, and thus their effect cannot be distinguished from state fixed effects. We can, however, compare states with community property (where everything is divided evenly) versus equitable division (where relative contributions are taken into account) to look for suggestive evidence that more equal asset division upon divorce is linked to greater specialization.

Using data from the American Community survey, Figure 2 shows the difference between male and female labor supply measures, both on the intensive and extensive margin, in community versus equitable

[21] Note furthermore that the increase in leisure would occur in the second period while our increased investment takes place in the first period.

states. The male–female hours gap is 10% larger in community property states, while the gap in extensive margin labor supply is nearly 30% larger. Of course, this difference could be confounded by state fixed effects, yet it nonetheless provides suggestive evidence that a stronger legal environment is more conducive to specialization.

Figure 2: Association Between Community Property Laws and Male − Female Labor Supply



Notes: 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.

To provide evidence that this relationship between the level of commitment and specialization persists with exogenous variation, we now turn to testing Proposition 5, the impact of a changing wealth "threshold" to access the commitment technology, in the form of house down payments. We argue that being able to purchase a home as a married couple substantially increases the capacity of a couple to save in a vehicle that will benefit the lower-earning partner. But, the ability to own a home is limited by having sufficient savings to cover the down payment, given the local housing market. Thus, we use idiosyncratic variation in local housing prices as a source of exogenous variation in the ability to invest in joint assets.

3.1 Homeownership as Commitment Technology

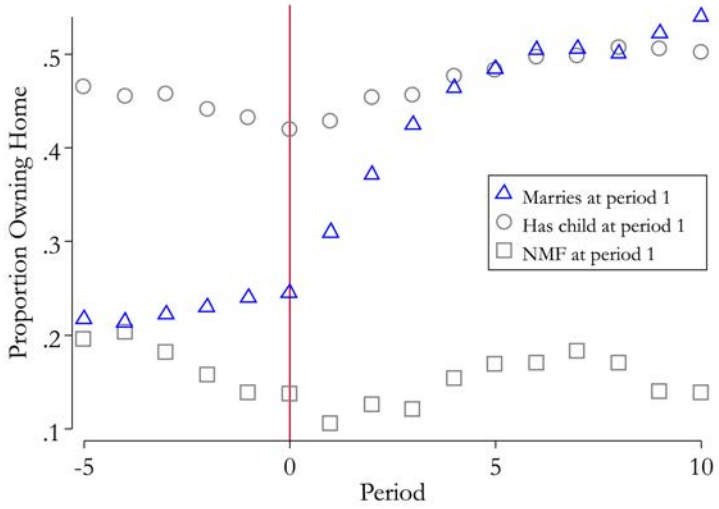
Investing in a family home creates a way for a couple to save in an asset with high commitment to sharing upon divorce. This is due to the high rates of assignation of the marital home to wives as well as the difficulty in hiding or disposing of it prior to official divorce. As child custody is often given to mothers, the family home is also more often allocated to the mother as well (Weitzman, 1981), irrespective of the specific legal regime. 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, homes are observable and illiquid. Thus, access to homeownership will also impact access to the commitment technology in our model.

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."[22] Legally, homeownership plus marriage creates a state-contingent contract through which a man can put at stake some resources in case of a divorce.[23] Alternatives, e.g., divorce insurance, are scant since private markets would be riddled with private information problems.[24] 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).

Data indeed shows an intimate link between home purchase and marriage. Figure 3 examines homeownership rates quarterly for men aged 21-35 around the time that they marry or have children. Home acquisition rates spike precipitously for those in the period immediately following marriage, going from around 25% homeownership to 50% within six quarters. For a different life event, though, having children, 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 children 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, which our model explains for the first time.

Figure 3: Association Between Marriage and Home Purchase



Notes: Data uses the 2008 Survey of Income and Program Participation. It restricts the sample to men who enter the first wave without a previous life event (marriage or birth) and for whom we observe such a life event during the subsequent 15 waves. 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.

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

[23] 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.

[24] 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.

3.2 Empirical Specification

Our model predicts that access to a joint savings technology should have a causal impact on how much each partner invests in public goods, such as children, versus their future career. We can measure specialization via men's and women's work hours and resulting wages, and proxy public goods with the number of children and their human capital.

Of course, if we looked at the difference in these outcomes between homeowners and non-homeowners, we might be identifying selection, rather than causality: those that wish to invest more in children might choose to buy homes as one such input. Therefore, we need a source of exogenous variation in homeownership. We therefore use idiosyncratic variation in housing prices at the time of marriage, while controlling for current housing prices. The data presented in Figure 3 suggests that the year of marriage is a crucial time when couples acquire homes, suggesting that lower housing price at the moment of marriage would make the couple permanently more likely to be homeowners. We think of this, in terms of our model, as easier access to the commitment technology: a savings vehicle that is divided favorably to the lower-earning partner upon divorce.

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, from which we can derive the year in which individuals married. We restrict our sample to households where it is one individual's first marriage and where the marriage occurred between 1991 and 2014. We merge this database by year of marriage and state of residence to the Federal Housing Finance Agency's housing price index (HPI) based on purchase-only data. 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.

We choose to use state data because individuals are less likely to be able to avoid price shocks at the state-level, since changing state is very costly (compared to changing county if the variation were more highly localized). Importantly, our results are robust to using variation at the MSA level instead, as well as using the state of birth rather than the current state in order to eliminate any possible selection. We also show an alternate strategy using an instrument for housing prices to eliminate possibly correlated local economic factors.

Housing prices and rental prices are clearly related, but housing prices tend to be much more volatile. Whereas rental prices tend to change relatively smoothly with cost of living, housing prices can exhibit "boom and bust" cycles. We can demonstrate this using data on state-level rental prices from the Bureau of Economic Analysis (available after 2008), to examine how rental and homeownership prices co-move. Appendix Figure B.1 shows the residuals of each home prices and rents regressed on year and state fixed effects in four large states–California, Texas, Illinois, and Florida. After controlling for the national trends, rental cycles are largely smooth, whereas state housing prices still exhibit considerable variation. The residuals of the two series do not appear to co-move substantially. 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. This suggests that our housing price index measure will capture variation beyond those shocks that would affect renters.

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

$$Y_{ismt} = \beta\left(-HPI_{sm}\right) + \eta_s + \nu_m + \delta_t + \gamma\, X_i + \psi\, HPI_{st} + \varepsilon_{ismt} \tag{4}$$

where the outcome of interest of a household i, in state s, married in year m and observed in year t (which is by definition post marriage) in the ACS is regressed on the household price index that was in place at the time of marriage m in the state where they currently reside s.

Importantly, a higher HPI in the year of marriage is expected to lead to *lower* homeownership, and thus lower the households' capacity to save jointly, per our model's predictions. For ease of interpretation, we thus use the negative of the HPI so that a higher value implies easier access to house purchases. We also 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.

Given that states may differ in many ways in addition to the evolution of their price index, we include fixed effects for each state. We also include fixed effects for each year of marriage m, to account for other macroeconomic factors and demographic trends at that time, and the survey year t. To rule out that correlation with current housing prices (which may affect these outcomes) drives our effects, we additionally control in subsequent specification for the *current* housing price index, which varies by both state and survey year. We also add controls such as the age of the married individual, their gender, and their educational attainment.

Because our analysis requires us to condition on marriage (because we can only assign a HPI for the year of the marriage if a couple has entered into a marital union), one might worry selection into marriage could affect our results. Our model predicts that access to the commitment technology could affect the choice to marry in the first place, and housing prices could impact that access. The model's prediction on selection for specialization and public goods' creation is ambiguous, but we can speculate that such selection would actually limit our capacity to find support for our model, since, in periods of lower housing prices, we would see "worse" couples enter marriage. This would thus lead to an underestimate of the benefits of lower housing prices for child quality. We come back to this in our robustness section.

3.3 Results

We initially demonstrate that lower HPI at the time of marriage is indeed linked to higher homeownership at the time of the survey. We then examine its impact on specialization, via labor supply and hours, as well as a measure of the "outcome" of these specialization decisions, wages. We also present results on public goods and divorce. We present multiple robustness checks to verify that our results are not driven by alternative channels, and further utilize an instrumental variables strategy to eliminate any possible confounding from local economic conditions.

3.3.1 Effect of Housing Prices on Homeownership

We first show that the housing price index at marriage indded creates variation in the endogenous variable of interest, homeownership, in Table 1. 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 3 percentage point change in the rate of homeownership. That is, when the housing price index was lower by 1 point when they married, couples were 3 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.

Table 1: Relationship between house price at marriage and homeownership

	Dependent variable: Own Home		
	(1)	(2)	(3)
−House Price Index	0.0273***	0.0277***	0.0324***
	(0.00546)	(0.00543)	(0.00615)
Year of Survey HPI	No	Yes	Yes
Additional Controls	No	No	Yes
Observations	3220736	3220736	3220736
R-Squared	0.0666	0.0666	0.124

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. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

3.3.2 Effect of Housing Prices on Specialization

Labor Supply Our model suggests that access to a collateralized contract will enable the couple to have more division of labor within the household. We examine this by looking at labor supply for each men and women, presented in Table 2. The baseline effect is the effect for men, while the effect for $-HPI \times female$ is the effect for women relative to men. 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 more hours worked per week for women (summing the main and interaction effects).

Importantly, our results show that on the intensive margin, the effect of lower HPI go in the opposite direction for men and women. For usual hours worked, the effect of decreased housing prices is positive and significant for men – higher hours – while the interaction effect is negative and significant. 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 (McClelland and Mok, 2012).[25] 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

[25]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.

Table 2: Relationship between house prices at marriage and labor supply

	Dependent variable:					
	Worked Last Year			Usual Hours Worked		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	0.00370	0.00383	0.00343	0.418***	0.424***	0.409***
	(0.00256)	(0.00253)	(0.00266)	(0.127)	(0.126)	(0.117)
−HPI × female	-0.0134***	-0.0134***	-0.0108***	-1.335***	-1.335***	-1.186***
	(0.00383)	(0.00383)	(0.00355)	(0.258)	(0.258)	(0.249)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	3702212	3702212	3702212	3702212	3702212	3702212
R-Squared	0.0510	0.0510	0.100	0.114	0.114	0.163

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. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

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.[26]

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 3 percentage points and increases the usual work hours of men by 1 while decreasing that of women by 2.5. In other words, if a household goes from not owning a home to owning a home (in this calculation), male labor increases by 10 hours and female labor decreases by 25 hours, consistent with the story that owning a home will lead to a significant increase in division of labor.

Placebo and Heterogeneity Analysis One may be worried that housing prices influence spousal labor supply through other channels. In particular, housing markets may be correlated with general economic conditions leading potentially to different reaction by gender. We explore this by running the same regression we did above but this time using the unemployment rate at the time of marriage as the explanatory variable, in place of housing prices. The results are presented in Panel A of Table 3. They show that unemployment at the moment of marriage does not appear to influence the probability that either men or women worked last year. Being married in a state and year where unemployment was high leads men to work fewer hours and women to work more. 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.

[26]This could also partially reflect higher bargaining power of women as in other studies (e.g., Voena, 2015) that have used labor supply as a measure of bargaining power within the union. However, since in our case 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 goods' provision. In the next sub-section, we also show directly higher levels of public goods in support of our channel.

Note however that 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. This is something we will explore further using an instrument.

However, this does not rule out the possibility that our results stem from wealth effects derived from purchasing a home in a low price market. As we have outlined, wealth effects could not explain the opposite effects for men and women. But, we explore this further by looking at the housing prices 3 years after the marriage in Panel B of Table 3. According to our framework, couples would need to provide commitment at entry into the relationship for this to play a relevant role in future decisions. We find that the impact of the housing price on labor supply of couples is significantly more muted 3 years after the entry into the relationship than at the moment of marriage. This appears to indicate that it is not any sort of wealth gain that has the diverging impact we document on spousal labor supply but that it appears to be related to conditions around the time of marriage.

Additionally, 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, Panel C of Table 3 shows that our effect is entirely absent for renters. There is a null effect of HPI on specialization for renters, with if anything a slightly negative—rather than positive—impact on men's labor supply.

Finally, we may think that high skill women may be facing particularly high costs of specialization and may thus be more affected by the presence of assets to "insure" her investments. The last panel of Table 3 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, but rather through the channel that we identified.

Wages As the model predicts an effect on women's future earning ability, we should also be able to see a change in wages. 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 4 by examining the impact of housing-price-induced homeownership on the relative wages of women versus men. We find that lower housing prices 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.

These wage effects can be thought of as measuring $\Omega_k(1-\tau_k)$ in our model. 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.

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., 2017; Bronson et al., 2017; Angelov et al., 2016), but add evidence that women experience these declines more when they are in collateralized relationships, which

Table 3: Placebo and Heterogeneity Analysis: Labor Supply

	Dependent variable:	
	Worked Last Year	Usual Hours Worked
	(1)	(2)
	Panel A: Unemployment	
Unemployment	-0.00108	-0.186***
	(0.000933)	(0.0373)
Unemp. × female	0.00195	0.313***
	(0.00159)	(0.0609)
Observations	3702212	3702212
R-Squared	0.100	0.163
	Panel B: HPI 3 years after marriage	
−House Price Index	-0.000682	0.159
	(0.00320)	(0.156)
−HPI × female	-0.00154	-0.574**
	(0.00450)	(0.263)
Observations	3644836	3644836
R-Squared	0.101	0.164
	Panel C: Renters	
−House Price Index	0.00128	-0.224**
	(0.00213)	(0.109)
−HPI × female	-0.00492	0.0275
	(0.00574)	(0.203)
Observations	1165178	1165178
R-Squared	0.104	0.156
	Panel D: Only college-educated individuals	
−House Price Index	0.0157***	1.493***
	(0.00358)	(0.249)
−HPI × female	-0.0347***	-3.252***
	(0.00460)	(0.472)
Observations	1408667	1408667
R-Squared	0.0590	0.130
Year of Survey HPI	Yes	Yes
Additional Controls	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. Standard errors are clustered at the state level. The last panel is restricted to individuals who report more than 12 years of schooling.

Table 4: Relationship between house prices at marriage and relative wages

	Dependent variable:					
	Wage (level)			Log hourly wage		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	3680.0***	3727.6***	3721.6***	0.0184*	0.0195*	0.0186***
	(809.4)	(798.7)	(739.3)	(0.00978)	(0.00987)	(0.00553)
−HPI × female	-7858.3***	-7859.3***	-7063.3***	-0.0895***	-0.0895***	-0.0666***
	(992.1)	(992.2)	(961.9)	(0.0122)	(0.0122)	(0.0104)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	3702212	3702212	3702212	2900523	2900523	2900523
R-Squared	0.0756	0.0756	0.199	0.0728	0.0729	0.237

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. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

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.

3.3.3 Effect of Housing Prices on Public Goods

We now turn to measuring 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. Table 5 shows each outcome in three separate columns. The first column corresponds to our baseline specification; the second column adds controls for HPI at the time of the survey and the last columns adds to that additional controls. The table suggests that households that were in a favorable housing market in the year they were married also show some evidence of changes in child outcomes.

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

Table 5: Relationship between house prices at marriage and child investment

	Grade Retention			Number of Children		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	-0.00793***	-0.00796***	-0.00879***	0.0384*	0.0383*	0.0311
	(0.00233)	(0.00233)	(0.00254)	(0.0210)	(0.0210)	(0.0201)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	2428234	2428234	2428234	3702212	3702212	3702212
R-Squared	0.00869	0.00869	0.0232	0.0936	0.0936	0.134

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. Fixed effects for the year of marriage, current year, and state as well as year of survey fixed effects are included in all specifications. Standard errors are clustered at the state level.

by 0.03, although this result is only marginally significant.[27]

Finally, we also use the total labor supply of the couple as a way to measure the provision of public goods. We find, as shown in Appendix Table B.1, that being married when housing prices were lower implied less total labor supply from the couple, indicating potentially a higher provision of public goods.

The main threat to identification of these results is possible income effects resulting from housing appreciation when couples face an idiosyncratically low housing price at marriage compared to today's prices. Thus, we acknowledge that these results are suggestive only, but are nonetheless consistent with the predictions of our model.

3.3.4 Robustness

We now show that our results are robust to a variety of checks.

First, one could be worried that our results are driven by selection. As said previously, we restricted our sample to ever married individuals in order to assign them housing prices at the moment of marriage. To verify that this condition is not driving our results, we repeat the exercise using all individuals who turned 25 (the median age at first marriage in our sample) between 1991 and 2014 and assigning them the housing price at that age in their current state of residence. We run Equation (4) on that sample with fixed effects for state and year of birth, adding controls for the year of the survey HPI as we have done previously. Results of this exercise are presented in Table B.2 where we show that our results are, if anything, even stronger in this case than before.[28] This suggests that it is unlikely for our results to be driven by selection.

As an additional check, even though marriage is endogenous in our model, and thus these results should be interpreted with caution, we repeat the same exercise for never married individuals in Table B.3, and find

[27]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.

[28]While there may be consequences of graduating in a period of good housing conditions, it is unlikely that these economic shocks would make one gender work more and the other work less.

a null result. This further strengthens our argument that there is a channel from housing prices to housing to specialization for married individuals only.

To look at selection more directly, we then check if the identity of those in our married sample changes depending on housing conditions at the moment of their marriage. We find that a lower HPI at the year of marriage is correlated with married couples having fewer years of education, see Appendix Table B.4. This provides empirical support that the selection is likely to work against us finding the pattern predicted by our model.

Another form of selection could be movement in response to housing markets. Our main analysis uses state level variation in housing prices specifically because mobility between states based on housing markets is less likely than mobility between metro areas. However, this means aggregating results at a level that may contain very different housing markets. Thus, to check that our results hold with finer variation, in Appendix Table B.5 we use MSA-level HPI variation instead, and restrict our sample to MSAs only. Lower housing prices are associated with lower probability of grade retention and more children, although that result is no longer statistically significantly different from 0. We also find similar patterns for labor specialization with lower housing prices leading to more traditional gender roles. Thus, our results do not seem to be driven by the fact that we employ a geographic level that, in some cases, may include very different housing markets.

Then, in case even state of residence is endogenous to the housing price index, we, in Appendix Table B.6, use the state of birth as the unit of analysis instead of the state of actual residence. The selection, if any exists, should bias results against our hypothesis in the main analysis. Indeed, the analysis with state of birth supports this view. We find extremely similar patterns in all outcomes. Our results for child investments are almost identical for grade retention and for number of children. Our results for work specialization are even stronger and more significant. This leads us to believe that selective migration is unlikely to explain the patterns we find above.

One could also worry that our results are in part driven by the housing collapse of the Great Recession. We exclude marriages contracted between 2008 and 2011, and present these results in Appendix Table B.7. We find similar results as in our main sample, suggesting that the variation we exploit goes well beyond that of the Great Recession.

We finally include year of marriage interacted with Census region dummies to try to capture any sort of time-varying cultural differences that could be impacting our result. This is extremely demanding of our empirical strategy because it reduces the analysis to within-region, between-states variation. Nevertheless, as shown in Appendix Table B.8, we find that the magnitudes of the coefficients are barely affected by the introduction of the additional controls. Our standard errors are weakened but the results for labor division remain very robust to this addition.

3.3.5 Instrumenting for Housing Prices

The principal concern with our identification strategy is that the residual state-year variation in the housing price index is endogenous to local economic conditions in a way that could influence decisions at the moment of the marriage, or the later evolution of economic outcomes. We thus seek an instrument that is correlated with the housing price index but not influenced by local economic conditions. Palmer (2015) provides such an approach, by exploiting the fact that there is a pattern of volatility in housing prices

Table 6: Relationship between instrument, House Price Index, and homeownership

	Dependent variable: House Price Index			Dependent variable: Own home		
	(1)	(2)	(3)	(4)	(5)	(6)
$-\widehat{\text{HPI}}$	0.0529***	0.0529***	0.0529***			
	(0.0178)	(0.0178)	(0.0178)			
−House Price Index				0.0560**	0.0563**	0.0828***
				(0.0230)	(0.0223)	(0.0229)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	2883502	2883502	2883502	2883502	2883502	2883502
R-Squared	0.835	0.835	0.835	0.0617	0.0617	0.121

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. $-\widehat{\text{HPI}}$ is as defined in equation 5. In the last three columns, housing price is instrumented for by $-\widehat{\text{HPI}}$. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

that is persistently different between locations in the United States. Some regions of the country are more subject to housing booms and busts than others. Thus, it is possible to multiply contemporaneous national housing cycles by past local volatility measures and obtain an instrument for local housing prices unaffected by current local economic conditions.

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 and obtain a value of σ_i, 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:

$$\widehat{HPI_{it}} = HPI_{-i1996} + \sum_{k=1997}^{t} \sigma_i * (HPI_{-ik} - HPI_{-ik-1}) \tag{5}$$

where HPI_{-ik} is the house price index in year k in all other states minus i (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.[29] Palmer (2015) conducts the analysis using time dummies instead of the national price index but the logic is very similar.[30]

The first stage is very strong between the instrument and the actual price index, as shown in the first two columns of Table 6. The F-stat for the first stage, in columns 1 through 3, is around 8.8. We next show that the results presented in our paper are robust to instrumenting for the house price index using the

[29]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.

[30]We have obtained extremely similar results when simply interacting the σ_i 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.

above instrument. We focus on the results only with all controls but the elimination of these controls do not change in any significant way the results presented.

The last three columns of Table 6 confirm that the positive impact of low HPI on home-buying persists even with an 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.

Table 7's first panel repeats the analysis for labor supply of men and women 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. Table 7 shows that the asymmetric reaction of men and women 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 extensive margin but strongly positive for the intensive margin on hours, while the interaction term between female and HPI is always negative and significant (and the sum is also negative). We show in Appendix Table B.9 that the results for wage also hold with the IV strategy.

Table 7: IV: Relationship between house prices at marriage and child investment and division of labor

	Dependent variable:					
	Worked Last Year			Usual Hours Worked		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	0.0124**	0.0125**	0.0174**	-0.105	-0.101	0.239
	(0.00482)	(0.00493)	(0.00694)	(0.546)	(0.553)	(0.570)
−HPI × female	-0.0187***	-0.0187***	-0.0167***	-1.518***	-1.517***	-1.399***
	(0.00533)	(0.00533)	(0.00477)	(0.316)	(0.316)	(0.293)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	3330278	3330278	3330278	3330278	3330278	3330278
	Grade Retention			Number of Children		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	-0.0274***	-0.0275***	-0.0306***	0.227**	0.228**	0.191*
	(0.00787)	(0.00782)	(0.00851)	(0.106)	(0.106)	(0.105)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	2145451	2145451	2145451	3330278	3330278	3330278

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. In the top panel, it and its interaction with female are instrumented for with the predicted value of the first stage of $-HPI$ on $-\widehat{\text{HPI}}$, as defined in equation 5, and the interaction of that predicted value with a dummy for female. In the bottom panel, it is instrumented for with $-\widehat{\text{HPI}}$. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

The second panel indicates that when a couple faces an exogenously easier housing market at the moment

of marriage, they are less likely to have children in the household who experienced grade retention and also to have more children, again confirming our results using HPI. The magnitudes are larger suggesting that unobserved economic conditions correlated with low housing prices were likely to negatively impact our child quality outcomes, as one might expect, since prices rise when the economy is performing well.

Finally, we repeated the instrumental variable strategy in the robustness sample where we did not condition on marriage. We instrumented the HPI at age 25 with the same instrument as the one presented above for the HPI at year of marriage. Results are presented in Table B.10 and show no indication that selection is a main reason behind our results, even once instrumented.

3.3.6 Effect of Housing Prices on Marital Stability

Finally, we examine the impact of easier home access on divorce. 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 8 shows the impact of the home price index at the time of marriage on the probability that the person interviewed is found to be divorced at the time of the survey. The first three columns present the OLS specification while the last three present results with instrumented HPI as in the sub-section above. The results are marginally significant in the OLS, but strongly significant in the IV. These results suggest that divorce decreases with lower housing prices.

Table 8: Relationship between house prices at marriage and divorce probability

	Dependent variable: Divorce Status					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	-0.00586	-0.00580	-0.00609*	-0.0467***	-0.0468***	-0.0506***
	(0.00351)	(0.00353)	(0.00364)	(0.0158)	(0.0158)	(0.0173)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	3665398	3665398	3665398	3299318	3299318	3299318
R-Squared	0.0295	0.0295	0.0409	0.0299	0.0299	0.0408

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 three columns instrumented for with $-\widehat{\text{HPI}}$, as defined in equation 5. Fixed effects for the year of marriage, current year, and state are included in all specifications. Standard errors are clustered at the state level.

Together, the results on the relationship between housing prices and home purchase, parental time allocation, 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.

4 The Role of Assets in Marriage Selection

Our model predicts that since marriage specifically provides a contractual obligation to share joint savings, it may be more valuable to people who have assets, and are therefore able to take advantage of the commitment device. This aligns with existing evidence in the literature showing a strong relationship between wealth and marriage (Lundberg et al., 2016; Schneider, 2011). In Lafortune and Low (2017), we demonstrate that the stylized fact of higher marriage rates for people with higher assets holds even conditioning on wages, education, and race.[31] In order to separate this from a selection effect, we now test Proposition 6 in our model, that the differential value of marriage versus cohabitation for people with assets will grow as marriage and cohabitation 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.

Table 9 shows how the marriage and cohabitation contracts have increased their similarity over the last 50 years, leaving asset division as the remaining separator. With the introduction of unilateral divorce in the 1970s and parental rights and responsibilities for non-marital fathers in the 1990s, the marriage and cohabitation contracts became more similar in all regards except for the presumed "jointness" of any assets acquired during the relationship.

Table 9: Convergence Between Marriage and Cohabitation Contract

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

Notes: Assumes cohabitation with children. 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).

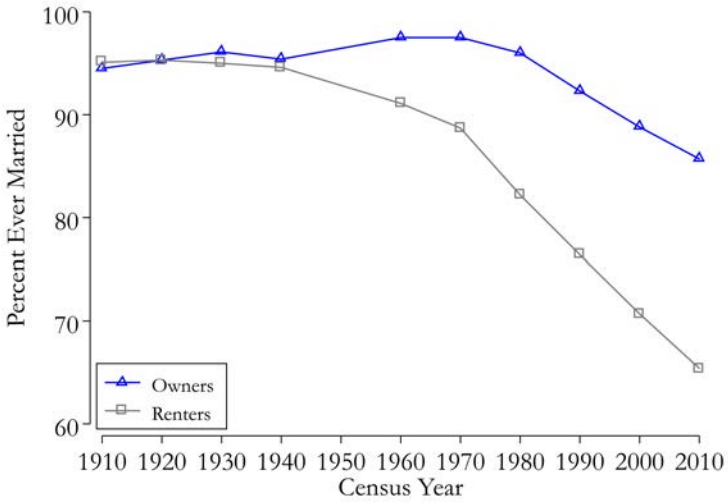
As a first check on whether assets have played an increasing role in marriage selection over time, we use data from the US Census on marriage rates by homeownership, which we have argued is an important asset for American families. We see in Figure 4 that the decline in ever marrying has been experienced by those who rent homes much more than people who own. And, going back to 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.

For a stronger test of Proposition 6, we can use the state-year variation in the policy changes outlined in Table 9. 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.[32]

[31] 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.

[32] While there were other accompanying policy and social changes that weakened marriage and strengthened cohabitation, we focus on these two because there is state-level variation in the roll-out of these policies, which can be used for identification.

Figure 4: 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.

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.

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

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).

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.

4.1 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.[33]

The equation being estimated is:

$$Evermarry_{ist} = \beta\, unilateral_{st} \times assets_i + \nu\, assets_i + \xi\, unilateral_{st} + \gamma\, X_i + \eta_s + \delta_t + \varepsilon_{ist} \qquad (6)$$

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

We designate asset-holding individuals based on asset income, which is more likely to indicate the types of financial assets that could be invested in a marital property.[34] 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.

Table 10 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

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

[34] 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 10: 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**
	(0.0734)	(0.0746)	(0.0723)
Owns Assets	0.0829	-0.0366	-0.0255
	(0.0572)	(0.0641)	(0.0614)
Inc, educ, race 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. Standard errors are clustered at the state level.

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.

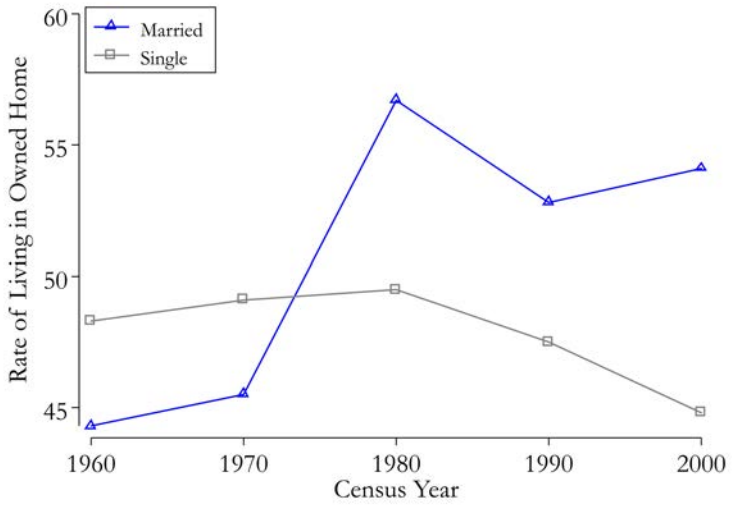
To examine this more directly, while Figure 3 shows that today marriage and homeownership are closely related, and Figure 4 shows this association has strengthened over time, we would like to see if young couples changed their behavior based on prevalent laws. Figure 5 shows the homeownership rates for 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.

4.2 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.

Figure 5: 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. Homeownership is measured for the household head, so not necessarily the individual in question. We include non-heads to ensure that selection between head status is not driving the results.

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:

$$Evermarry_{ist} = \beta\, IHVPE_{st} \times assets_i + \nu\, assets_i + \xi\, IHVPE_{st} + \gamma\, X_i + \eta_s + \delta_t + \varepsilon_{ist} \tag{7}$$

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.[35]

Table 11 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

[35] As explained in footnote 34, we exclude homeownership from assets.

Table 11: Paternity establishment laws and marriage rates, by asset status

	Dependent variable: Ever Married		
	(1)	(2)	(3)
IHVPE × Assets	0.0383**	0.0367**	0.0359**
	(0.0172)	(0.0171)	(0.0168)
Owns Assets	0.0399***	0.0219***	0.0216***
	(0.00733)	(0.00703)	(0.00710)
Inc, race, and educ control	No	Yes	Yes
State-specific time trend	No	No	Yes
Observations	10670	10670	10670
R-Squared	0.0937	0.102	0.106

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. Standard errors are clustered at the state level.

these alternative contracts are strengthened.

Overall, we find this evidence persuasive of an increasing role of assets and wealth 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.

5 Conclusion

We present the first model on the role of assets in "collateralizing" the marriage contract. We demonstrate that a highly general model of investment in a public good with limited commitment can generate the effect that joint savings helps reduce the problems generated by limited commitment. Our model demonstrates that collateralization increases specialization and public goods' creation precisely by strengthening the marriage contract, providing greater assurance to the partner investing more heavily in children.

Our model provides the empirical implications that greater access to the commitment technology will lead to more specialization and public goods' 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 specialize more within the household and appear to have higher levels of public goods, proxied by children. These results are robust to a number of alternative specifications, including instrumenting for housing prices.

The model also suggests that the value of marriage will be increasing in wealth, and that this gradient in marriage by wealth will substantially increase as marriage and cohabitation 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 wealthy individuals 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."

Our analysis brings the insight from standard economic theory that a limited contract space may destroy economic value to the area of the household for the first time. This is important, because of course there are many compelling reasons to allow easier exit from marriage, such as allowing women to leave abusive situations (Stevenson and Wolfers, 2006). However, the fact that reducing the contract security may have hampered specialization and other efficiency gains from marriage, and therefore eroded marriage's value for those not able use collateral to strengthen the contract, has perhaps not been sufficiently considered. Moreover, the ability of women to exit bad unions via unilateral divorce may be limited without the protection of post-divorce consumption that collateralization provides.

If it is true that marriage is valuable as a commitment device for investing in public goods, such as children, and those with access to collateral (via wealth accumulation or homeownership) have access to a stronger marriage contract, there are large 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," pointed to by Doepke and Zilibotti (2019) as a major driver of inequality. Moreover, access to wealth, and particularly homeownership, has historically been differential along racial lines, highlighting a new axis of racial disparity. For example, while the white-black income gap is large, the white-black asset gap is *substantially* wider (Kuhn et al., 2019; 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. Our model suggests a mechanism linking this gap to a corresponding gap in marriage rates. Similarly, our model provides an underlying mechanism for the lower marital college premium Chiappori et al. (2017a) identifies for black women, which they link to lower human capital investments in children. Asset ownership and homeownership have not previously been considered as a driver of marital value, and thus the ability to insure child investments. 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 allows one partner to specialize more in home production than the other. Weaker contracts would reduce the degree of insurance that partners obtain. Indeed, the "traditional" division of labor in the household collapsed over the same time period as the marriage contract was substantially weakened (Sayer, 2005). With this change, marriage rates have fallen, indicating its value may be related to the ability to specialize, something that warrants further explanation in future work. More broadly, the ability to sacrifice one's own interests in favor of public goods' creation may be key for marriages creating surplus, and naturally requires strong commitment. 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.

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A Omitted proofs

A.1 Proof of Proposition 1

Recall the couple will choose τ_i and τ_j such that:

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

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:

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

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 $c^d_{2j}>c'_{2j}>c_2>c'_{2i}>c^d_{2i}$, then $u'(c^d_{2j})<u'(c'_{2j})<u'(c_2)<u'(c'_{2i})<u'(c^d_{2i})$. Since $\beta>\gamma_\phi>\frac{1}{2}$, we have

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

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

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.

As β increases, the ratio of marginal costs of the i to j partner will increase. This is because $\frac{\beta u'(c^d_{2i})+(1-\beta)u'(c^d_{2j})}{\beta u'(c^d_{2j})+(1-\beta)u'(c^d_{2i})}$ is increasing in β since its derivative with respect to β is proportional to:

$$\begin{aligned}&\left(\beta u'(c^d_{2j})+(1-\beta)u'(c^d_{2i})\right)\left(u'(c^d_{2i})-u'(c^d_{2j})+(\beta u''(c^d_{2i})-(1-\beta)u''(c^d_{2j}))\frac{\partial c^d_{2i}}{\partial\beta}\right)\\&\quad-\left(\beta u'(c^d_{2i})+(1-\beta)u'(c^d_{2j})\right)\left(u'(c^d_{2j})-u'(c^d_{2i})-(\beta u''(c^d_{2j})-(1-\beta)u''(c^d_{2i}))\frac{\partial c^d_{2i}}{\partial\beta}\right)>0.\end{aligned}$$

A similar argument can be made for the ratio of marginal costs when the couple renegotiates. And thus, the greater is β, the less specialization there will be.

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 goods' 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 Completion of Proof of Proposition 3

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 $c^d_{2j}(\tau_i, \tau_j)$ for each level of investment and the lower earning partner $c^d_{2i}(\tau_i, \tau_j)$. 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 $\tilde{c^d_{2j}}(\tau_i, \tau_j)$ and $\tilde{c^d_{2i}}(\tau_i, \tau_j)$, 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 $c^d_{2i}(\tau_i, \tau_j) = \tilde{c^d_{2i}}(\tau_i, \tau_j)$, which necessarily implies that $c^d_{2j}(\tau_i, \tau_j) < \tilde{c^d_{2j}}(\tau_i, \tau_j)$, is not possible, because the marginal return to savings under commitment when divorced is given by:

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

while the return without commitment is:

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

If savings were decreased to the point that $c^d_{2i}(\tau_i, \tau_j) = \tilde{c^d_{2i}}(\tau_i, \tau_j)$, 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 $c^d_{2j} < \tilde{c^d_{2j}}$, 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 $c^d_{2j}(\tau_i, \tau_j) = \tilde{c^d_{2j}}(\tau_i, \tau_j)$, which necessarily implies that $c^d_{2i}(\tau_i, \tau_j) > \tilde{c^d_{2i}}(\tau_i, \tau_j)$, 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 $c^d_{2i} = c_2$, since at that point, $c^d_{2j} = c^d_{2i} = \tilde{c^d_{2j}} > \tilde{c^d_{2i}}$. 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 $c^d_{2j}(\tau_i, \tau_j) = \tilde{c^d_{2j}}(\tau_i, \tau_j)$) changes with α in the following way:

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

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.3 Completion of Proof of Proposition 4

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^d_{2i} and c^d_{2j} and that when having only access to the δ asset as $\widehat{c^d_{2i}}$ and $\widehat{c^d_{2j}}$.

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:

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

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.

A.4 Completion of Proof of Proposition 6

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_{2i}^d and c_{2j}^d.

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:

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

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 $\overline{c_2} > c_{2j}^d$ 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.

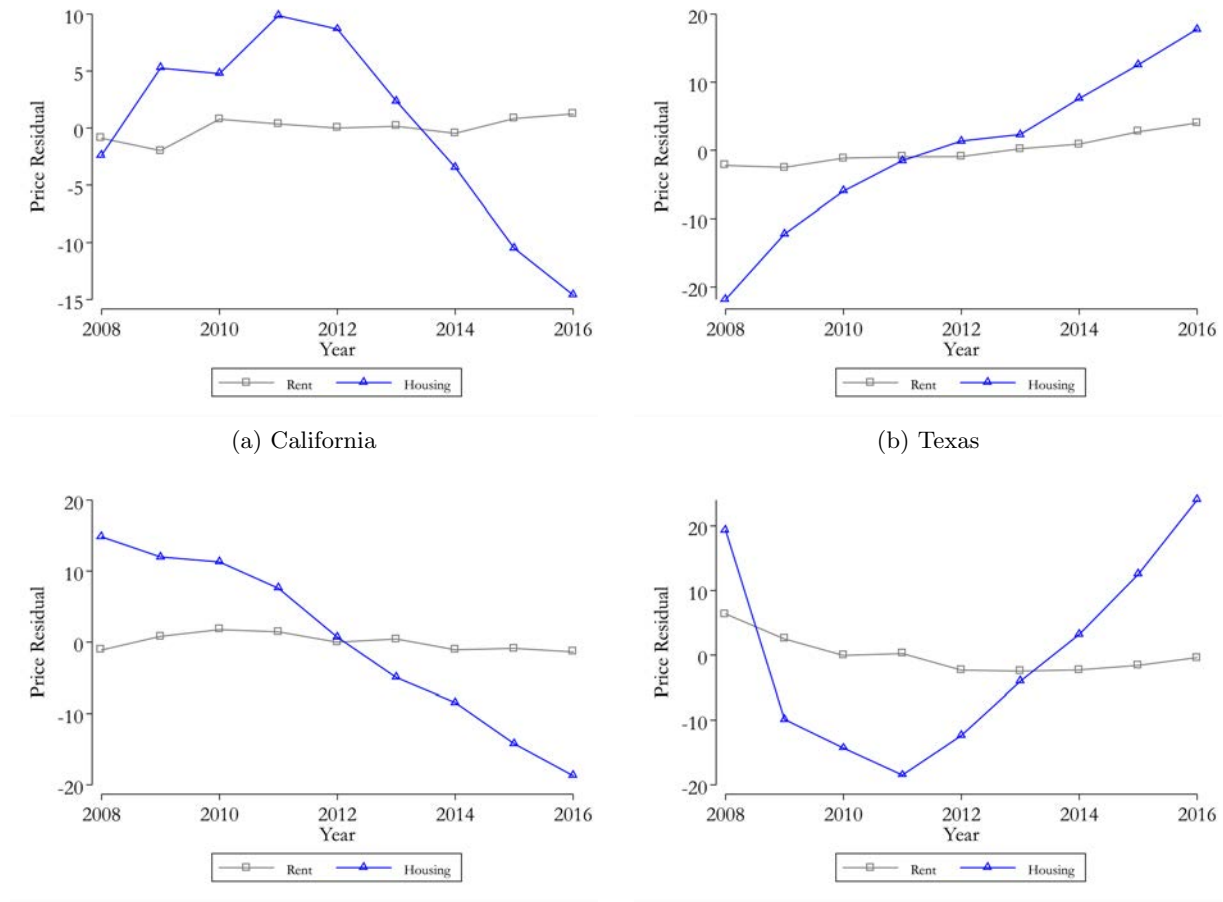
Let us now compare savings in cohabitation when income sharing increases such that we compare low income sharing at $\underline{\beta}$ with higher income sharing at β, where $\underline{\beta} > \beta$ (i.e., each partner retains a higher share of their own income). In both cases, savings are divided using the δ sharing rule. Defining consumption as c_{2i}^d and c_{2j}^d when income sharing is higher and $\underline{c_{2i}^d}$ and $\underline{c_{2j}^d}$ 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

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

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 cohabitation has higher income sharing since the marginal cost will be higher in this case. These combined imply that $c_{2j}^d > \underline{c_{2j}^d}$. By a similar argument as in the proof of the previous proposition, it must also be that $\underline{c_{2i}^d} > c_{2i}^d$. Combining these, for δ low enough or for $u''' < 0$, returns to savings would be larger in marriage than in cohabitation, which would imply that the optimal savings cannot be smaller with less income sharing. Thus, savings are decreasing in income sharing.

B Appendix Tables and Figures

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



(a) California

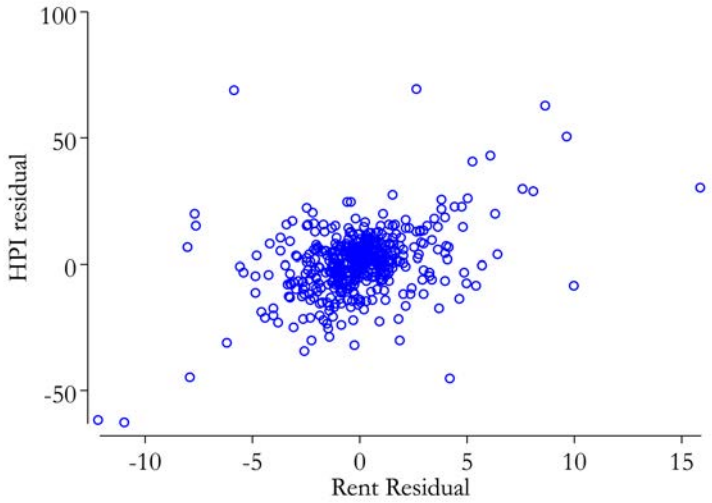
(b) Texas

(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 housing price index residuals across all states and years



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.

Table B.1: Relationship between house prices at marriage and total work hours of a couple

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	-0.756***	-0.748***	-0.665***	-2.766**	-2.762**	-2.230*
	(0.211)	(0.209)	(0.231)	(1.184)	(1.190)	(1.260)
Year of Survey HPI	No	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	1440093	1440093	1440093	1299414	1299414	1299414
R-Squared	0.0163	0.0163	0.0582	0.0163	0.0163	0.0593

Notes: Data uses all couples 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 three columns instrumented for with $-\widehat{\text{HPI}}$, as defined in equation 5. 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.2: Relationship between house prices at age 25 and child investment and division of labor

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.0227***	0.0218***	1.144***	1.077***
	(0.00533)	(0.00586)	(0.241)	(0.262)
−HPI × female	-0.0431***	-0.0387***	-2.937***	-2.714***
	(0.00508)	(0.00461)	(0.327)	(0.308)
Additional Controls	No	Yes	No	Yes
Observations	7017176	7017176	7017176	7017176
R-Squared	0.0219	0.0732	0.0801	0.133
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00824***	-0.00770***	0.0805**	0.0790**
	(0.00243)	(0.00244)	(0.0316)	(0.0307)
Additional Controls	No	Yes	No	Yes
Observations	3213211	3213211	7017176	7017176
R-Squared	0.0108	0.0283	0.161	0.184

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 between 1991 and 2014. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year they turned 25, while housing prices in the current year are controlled for. Fixed effects for the year of birth and state of residence are included in all specifications. Standard errors are clustered at the state level.

Table B.3: Never Married: Relationship between house prices at age 25 and child investment and division of labor

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.0134	0.0124	0.0633	0.00721
	(0.00801)	(0.00772)	(0.372)	(0.328)
−HPI × female	0.00924***	0.00882***	1.014***	0.975***
	(0.00313)	(0.00247)	(0.231)	(0.193)
Additional Controls	No	Yes	No	Yes
Observations	3404779	3404779	3404779	3404779
R-Squared	0.0237	0.0879	0.0759	0.140
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00732	-0.00741	-0.00212	0.000471
	(0.00491)	(0.00508)	(0.0107)	(0.00791)
Additional Controls	No	Yes	No	Yes
Observations	370385	370385	3404779	3404779
R-Squared	0.0305	0.0440	0.0452	0.122

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 between 1991 and 2014 who are never married. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year they turned 25, while housing prices in the current year are controlled for. Fixed effects for the year of birth and state of residence are included in all specifications. Standard errors are clustered at the state level.

Table B.4: Relationship between house prices at marriage and individual's years of education

	Dependent variable: Educational attainment			
	(1)	(2)	(3)	(4)
−House Price Index	-0.102*	-0.0993*	-0.504**	-0.503**
	(0.0549)	(0.0544)	(0.199)	(0.197)
Year of Survey HPI	No	Yes	No	Yes
Additional Controls	No	No	No	No
Observations	3220736	3220736	2883502	2883502
R-Squared	0.0174	0.0174	0.0161	0.0161

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 5. 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.5: Relationship between house prices at marriage and child investment and division of labor: MSA-level variation

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.00222	0.00284	0.425**	0.439**
	(0.00322)	(0.00333)	(0.168)	(0.166)
−HPI × female	-0.0101**	-0.00860*	-1.250***	-1.158***
	(0.00497)	(0.00479)	(0.249)	(0.237)
Additional Controls	No	Yes	No	Yes
Observations	1094095	1094095	1094095	1094095
R-Squared	0.0603	0.102	0.124	0.168
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00339*	-0.00455**	0.0201	0.0167
	(0.00200)	(0.00210)	(0.0156)	(0.0160)
Additional Controls	No	Yes	No	Yes
Observations	775099	775099	1094095	1094095
R-Squared	0.00671	0.0288	0.124	0.153

Notes: Data uses individuals in the 2008-2014 ACS married within the last eighteen years who currently live in a MSA. House Price Index represents MSA-level housing prices from the Federal Housing Finance Agency in the year of marriage, while housing prices in the current year are controlled for. Fixed effects for the year of marriage and MSAs are included in all specifications. Standard errors are clustered at the MSA level.

Table B.6: Relationship between house prices at marriage and child investment and division of labor: State of birth

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.00794**	0.00415	0.724***	0.545***
	(0.00377)	(0.00341)	(0.196)	(0.181)
−HPI × female	-0.0156***	-0.0130***	-1.520***	-1.381***
	(0.00529)	(0.00475)	(0.362)	(0.334)
Additional Controls	No	Yes	No	Yes
Observations	2888992	2888992	2888992	2888992
R-Squared	0.0375	0.100	0.102	0.160
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00657***	-0.00657***	0.0381*	0.0297
	(0.00215)	(0.00220)	(0.0209)	(0.0195)
Additional Controls	No	Yes	No	Yes
Observations	1867030	1867030	2888992	2888992
R-Squared	0.00864	0.0221	0.0905	0.137

Notes: Data uses individuals in the 2008-2014 ACS married within the last eighteen years. House Price Index represents state of birth level housing prices from the Federal Housing Finance Agency in the year of marriage, while housing prices in the current year are controlled for. Fixed effects for the year of marriage, current year, and state of birth are included in all specifications. Standard errors are clustered at the state level.

Table B.7: Relationship between house prices at marriage and child investment and division of labor: without 2008-2011

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.00203	0.00206	0.359***	0.367***
	(0.00221)	(0.00266)	(0.128)	(0.119)
−HPI × female	-0.00904**	-0.00647*	-1.100***	-0.958***
	(0.00361)	(0.00335)	(0.236)	(0.225)
Additional Controls	No	Yes	No	Yes
Observations	3063008	3063008	3063008	3063008
R-Squared	0.0527	0.101	0.118	0.167
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00906***	-0.0102***	0.0280	0.0180
	(0.00266)	(0.00300)	(0.0252)	(0.0232)
Additional Controls	No	Yes	No	Yes
Observations	2102540	2102540	3063008	3063008
R-Squared	0.00883	0.0230	0.0719	0.126

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, while housing prices in the current year are controlled for. We exclude all marriages contracted between 2008 and 2011. 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.8: Relationship between house prices at marriage and child investment and division of labor: adding year of marriage × region dummies

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.00131	-0.0000502	0.349**	0.282**
	(0.00269)	(0.00239)	(0.160)	(0.139)
−HPI × female	-0.0134***	-0.0108***	-1.334***	-1.185***
	(0.00383)	(0.00355)	(0.258)	(0.248)
Year of Survey FEs	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes
Observations	3702212	3702212	3702212	3702212
R-Squared	0.0511	0.100	0.114	0.163
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.00378	-0.00416	0.0318	0.0299
	(0.00263)	(0.00272)	(0.0262)	(0.0258)
Additional Controls	No	Yes	No	Yes
Observations	2428234	2428234	3702212	3702212
R-Squared	0.00885	0.0234	0.0942	0.134

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, while housing prices in the current year are controlled for. Fixed effects for the year of marriage, its interaction with Census region dummies, current year, and state are included in all specifications. Standard errors are clustered at the state level.

Table B.9: IV: Relationship between house price index and wages

	Dependent variable:					
	Wage (level)			Log hourly wage		
	(1)	(2)	(3)	(4)	(5)	(6)
−House Price Index	3594.0	3619.5	6190.8***	-0.0627**	-0.0622**	0.00179
	(2427.5)	(2387.5)	(2128.0)	(0.0300)	(0.0303)	(0.0128)
−HPI × female	-8336.9***	-8329.6***	-7671.6***	-0.0885***	-0.0884***	-0.0685***
	(1003.4)	(1006.5)	(938.5)	(0.0137)	(0.0137)	(0.0117)
Year of Survey HPI	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes
Observations	3330278	3330278	3330278	2612991	2612991	2612991
R-Squared	0.0744	0.0744	0.198	0.0718	0.0718	0.237

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. It and its interaction with female are instrumented for with the predicted value of the first stage of $-HPI$ on $-\widehat{\text{HPI}}$, as defined in equation 5, and the interaction of that predicted value with a dummy for female. 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.10: IV: Relationship between house prices at age 25 and child investment and division of labor

	Dependent variable:			
	Worked Last Year		Usual Hours Worked	
	(1)	(2)	(3)	(4)
−House Price Index	0.0433*	0.0553**	2.621***	3.010***
	(0.0219)	(0.0249)	(0.685)	(0.794)
−HPI × female	-0.0527***	-0.0491***	-3.419***	-3.245***
	(0.00783)	(0.00707)	(0.471)	(0.441)
Additional Controls	No	Yes	No	Yes
Observations	6063283	6063283	6063283	6063283
R-Squared	0.0214	0.0738	0.0801	0.133
	Grade Retention		Number of Children	
	(1)	(2)	(3)	(4)
−House Price Index	-0.0374***	-0.0356***	0.267**	0.255**
	(0.00838)	(0.00793)	(0.107)	(0.107)
Additional Controls	No	Yes	No	Yes
Observations	2591048	2591048	6063283	6063283
R-Squared	0.0108	0.0300	0.172	0.203

Notes: Data uses individuals in the 2008-2014 ACS who turned 25 between 1991 and 2014. House Price Index represents state-level housing prices from the Federal Housing Finance Agency in the year they turned 25. In the top panel, it and its interaction with female are instrumented for with the predicted value of the first stage of $-HPI$ on $-\widehat{\text{HPI}}$, as defined in equation 5, and the interaction of that predicted value with a dummy for female. In the bottom panel, it is instrumented for with $-\widehat{\text{HPI}}$. Housing prices in the current year are controlled for in all specifications. Fixed effects for the year of birth and state of residence are included in all specifications. Standard errors are clustered at the state level.