Intrahousehold Bargaining, Female Autonomy, and Labor Supply: Theory and Evidence from India

Rachel Heath and Xu Tan *

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Abstract

Standard models of labor supply predict that unearned income decreases labor supply. In contrast, we propose a noncooperative bargaining model in which a woman's unearned income improves her autonomy within the household, which raises her utility of working and can increase her labor supply. By contrast, we show that a collective household model unambiguously predicts that a woman's unearned income decreases her labor supply. We find empirical support for the noncooperative bargaining model, using the Hindu Succession Act in India as a source of exogenous variation in a woman's unearned income.

1 Introduction

Women's labor force participation affects their status within the household (Anderson and Eswaran 2009; Atkin 2009), their marriage and childbearing decisions (Jensen 2012; Heath and Mobarak 2014), and the productivity of the economy overall (Dollar and Gatti 1999; Loko and Diouf 2009). A large literature on the determinants of female labor supply has highlighted the importance of opportunity costs of working,[1] availability of job op-

*Department of Economics, University of Washington; rmheath@uw.edu and tanxu@uw.edu. Scott Walters provided excellent research assistance. We thank Siwan Anderson, S Anukriti, Fahad Khalil, Melanie Khamis, Adriana Kugler, Jacob LaRiviere, Annemie Maartens, Sanchari Roy, Laura Schechter, Shing-Yi Wang, Hendrik Wolff, and participants at the University of Washington Labor-Development Brownbag, the University of Washington Center for the Study of Demography and Ecology seminar, the 2014 Pacific Development Conference, the 2014 Northwest Development Workshop, and the University of Washington Bangladesh Development Conference for helpful suggestions.

[1]In particular, there is much research on the relationship between fertility (Goldin and Katz 2002; Bloom et al. 2009; Agüero and Marks 2011) or childcare costs (Connelly, 1992) and female labor supply. Other research in this vein has examined the time required by household production (Greenwood, Seshadri and Yorukoglu, 2005) or caretaking of elderly household members (McGarry, 2006).

portunities in industries in which women have a comparative advantage (Rendall 2010; Jensen 2012), and cultural norms (Fernández, Fogli and Olivetti, 2004), but little is know about how the division of power within a household affects a woman's gains from earning income. Since there is now considerable evidence refuting unitary household models in favor of models in which intra-household bargaining takes place (Lundberg, Pollak and Wales 1997; Duflo 2003; Quisumbing and Maluccio 2003; Duflo and Udry 2004; Qian 2008; Luke and Munshi 2011), a natural question is how a woman's bargaining power within the household affects her labor supply.

This paper examines the effects of the Hindu Succession Act (HSA), which was phased into different states in India between 1976 and 2005, on the labor supply of women exposed to it. The HSA greatly improved women's ability to inherit property, thereby increasing their lifetime unearned income and their bargaining power. We find empirically that the HSA increased women's labor supply, especially into high-paying jobs. We develop a theoretical model of noncooperative bargaining in which a woman's level of unearned income increases her control over her income (which we call an autonomy effect) and thereby her gains from working. If the autonomy effect dominates the income effect of greater unearned income, then unearned income increases a woman's labor supply.

We further show that a collective household model unambiguously predicts a negative correlation between a woman's unearned income and her labor supply, analagous to the findings of McElroy and Horney (1981).[2] The reason for the distinct predictions between collective households and noncooperative households is the decision-maker: in a collective household, the social planner maximizes a weighted utility of the couple, and as the wife's weight goes up, the planner increases her leisure and makes her husband work more. Whereas in a noncooperative household, the wife maximizes her utility and controls only her choices, so as her power goes up, she cannot make her husband work more. Instead, she increases her labor supply in order to gain more from her increased bargaining power. Since only the noncooperative model fits our empirical results, we conclude that it is the most relevant model for the Indian context.

We identify the effects of the Hindu Succession Act on women's labor supply by taking advantage of the fact that it was phased in across states over time and only applied to Hindu women who were unmarried at the time of implementation. Because exposure to the reform is determined by a woman's endogenous timing of marriage, we utilize an instrumental variable strategy that predicts exposure using a woman's year of birth,

[2] Schultz (1990) tests the predictions of the collective model empirically and indeed finds that a woman's unearned income decreases her labor supply more than men's unearned income does. His results fit within the context of our model; he studies Thailand in 1980-1981, where women's access to high-paying jobs was relatively limited, and our model predicts the income effect would dominate for them as well.

religion, and state. To implement this strategy, we utilize the 2005-2006 National Family Health Survey of India, which provides information on a woman's exposure to the HSA, decision-making ability within the home, and labor supply, as well as potential confounding variables such as her human capital or the characteristics of her husband.

We begin by confirming that the HSA increased women's autonomy, namely, her participation in large household decisions, her access to a bank account, and her ability to go places without escort. We go on to find that exposure to the HSA increases a woman's probability of working by 6.8 percent. The effect is driven by work for a non-family member, for cash, and that takes place away from home, confirming the model's predictions of a greater increase in labor supply into high-paying jobs. The estimated effect is very similar if we use a difference-in-difference strategy that compares the difference in outcomes between younger (more exposed) and older (less exposed), in Hindu versus non-Hindu women. We also provide suggestive evidence that the HSA decreased the labor supply of single women, whom we argue faced the income effect but not the autonomy effect. We conduct robustness checks that suggest that these results are not driven by changes in premarital human capital investments, migration, or marital matching. Finally, we examine whether there are channels other than control of income through which a woman's autonomy can increase her labor supply (such as improving her health or that of her children). While we do find evidence of these health improvements, we find no evidence that they are driving the effects of the HSA on labor supply.

Previous literature has examined the Hindu Succession Act and other reforms to women's inheritance rights but has focused primarily on human capital and intra-household bargaining. Specifically, Roy (2013) and Deininger, Goyal and Nagarajan (2013) both find that the HSA increased girls' education, and Roy (2008) finds that it increased women's bargaining power. Its effects on women were not unambiguously positive, however. Rosenblum (forthcoming) shows that the HSA increased female child mortality, arguing that it raised the cost of girls to parents who would like to bequeath property to their sons. Anderson and Genicot (2014) argue that the HSA has intensified intra-household conflicts, increasing both domestic violence and suicides of men and women.[3] Other countries have had similar reforms to women's inheritance rights; Carranza (2012) finds that a reform in Indonesia decreased the use of son-biased fertility stopping rules, and Harari (2013) finds that a reform in Kenya increased women's education and bargaining power. Our model builds upon the relationship between inheritance law and bargaining power

[3]By contrast, Mathur and Slavov (2013) use a different identification strategy and data to find that the HSA decreased domestic violence. Both papers agree, however, that the reform increased women's control of decisions within the household.

by examining whether this increased bargaining power affects the labor supply decisions of women who are exposed to it.

Our paper contributes to the literature examining the determinants of female labor supply, especially in relation to economic development. Goldin (1994) points out that women's labor supply is U-shaped: it first declines and then rises as countries develop. Her argument is that income effects are particularly important when women's only option to work outside the home is manual labor, against which there is strong social stigma. As a country develops, women gain access to white collar work, which is less stigmatized, and they rejoin the labor force. We present a different (although complementary) explanation for this U-shape, based on the fact that women's legal rights to own and inherit property tend to rise as countries develop (Fernández 2014; Doepke and Tertilt 2009). When unearned income increases in our model, income effects will dominate for women who get low wage offers, holding constant men's unearned income (corresponding to a move from low to medium development), and women's labor supply will fall. As high wage offers become available, however, the autonomy effect will begin to dominate and labor supply will again increase.

Finally, our results provide further insight into the joint determination of female labor supply and autonomy. While previous literature has documented a causal effect of women's labor force participation on her bargaining power within the household (Anderson and Eswaran 2009; Atkin 2009), our results suggest that causality runs in the other direction as well. Since policy-makers often seek to increase women's labor supply as a way of improving development outcomes – see, for instance, the 2012 World Development Report – our results suggest that reforms that improve women's standing within the household have both a direct effect on outcomes such as children's health or education and an indirect effect through labor supply.

The rest of the paper proceeds as follows. In section 2 we develop a model of women's autonomy and household members' labor supply decisions that demonstrates the possibility that a woman's unearned income can increase her labor supply. Section 3 describes the data and empirical strategy that we use to test the model's predictions. In section 4 we provide our main results on labor supply, and in section 5 we present robustness checks and investigate alternative channels connecting women's autonomy and labor supply. Section 6 concludes.

2 Theoretical Model

In this section, we set up a simple model that identifies how a change in unearned income affects labor supply in a household setting. A standard *income effect* predicts that unearned income decreases labor supply. While our model incorporates this effect, we argue that a wife's unearned income also increases her autonomy – i.e. her control of her income – which raises her effective wage and thus may increase her labor supply. We denote this as an *autonomy effect*. In accordance with recent literature that shows that outcomes between husbands and wives are not necessarily efficient (Duflo and Udry 2004; Robinson 2012; Hoel 2013), our main model is a noncooperative model that does not impose Pareto efficiency. After deriving predictions from this model, we will contrast the results of the noncooperative model with a collective model (a cooperative setup).

Suppose the wife's utility has the following form:

$$u_f(x_f, z, l_f) = \beta_f lnx_f + \gamma_f lnz + \delta_f lnl_f$$

where her utility depends on her consumption x_f, the household public good z, and her leisure l_f. The wife spends a unit of time on outside work e_f and leisure l_f, so $e_f + l_f = 1$. To be correspond to the data we have on labor supply on the extensive margin, we assume e_f is a binary choice between 0 and E_f, where $E_f \in (0, 1)$ is an exogenous variable. For example, E_f could be $1/3$ to represent 8 hours of working. In appendix B.1, we derive a similar set of results when e_f is continuous. Furthermore, $\beta_f + \gamma_f$ is normalized to 1.

Suppose the husband's utility has an analogous form:

$$u_m(x_m, z, l_m) = \beta_m lnx_m + \gamma_m lnz + \delta_m lnl_m$$

where his utility depends on his consumption x_m, the household public good z, and his leisure l_m. The husband spends a unit of time on outside work e_m and his leisure l_m, so $e_m + l_m = 1$. e_m is also assumed to be a binary choice between 0 and some exogenous $E_m \in (0, 1)$. Similarly, $\beta_m + \gamma_m$ is normalized to 1.

The household public good is produced using contributions, y_f and y_m, from the wife and the husband respectively.[4] We assume its production function, $f(y_f, y_m)$, is linear in the inputs:

$$z = f(y_m, y_f) = y_f + y_m$$

[4]We consider the possibility that the wife can also contribute time to produce the household public good in appendix B.2. The equilibrium is similar, and the main result – in particular, the autonomy effect – remains.

The wife's optimization problem is

$$\max_{x_f, y_f, e_f} \beta_f ln x_f + \gamma_f ln z + \delta_f ln(1 - e_f)$$

$$s.t.\ e_f \in \{0, E_f\},\ z = y_m + y_f,\ y_f + p_f x_f \leq a_f(w_f e_f + R_f)$$

where p_f is the price of the wife's private good, w_f is the wage rate for her work outside the home and R_f is her unearned income. In the main model, we assume the wife can optimally choose her labor supply e_f. The possibility that her husband may make the final decision on her labor supply is discussed as an alternate model in appendix B.4.

We model autonomy (denoted by a_f) as the fraction of her income that the wife can spend: i.e. she retains $a_f(w_f e_f + R_f)$ of her total earned and unearned income. So with higher autonomy, the wife would report greater say in household purchases, which we confirm in section 4. We assume the autonomy is a function of the wife's share of unearned income:

$$a_f = \alpha_f \frac{R_f}{R_f + R_m}$$

where $\alpha_f \in (0, 1]$, such that the autonomy is increasing in the percentage of total unearned income coming from the wife. To correspond to our empirical strategy that uses exogenous variation in unearned income, we model autonomy as a function of unearned income. In appendix B.3, we show that our theoretical results hold if we assume autonomy depends on both unearned income and potential earned income. Finally, to sidestep the distracting possibility of zero total unearned income, we assume $R_f + R_m$ is positive.

The husband's optimization problem is

$$\max_{x_m, y_m, e_m} \beta_m ln x_m + \gamma_m ln z + \delta_m ln(1 - e_m)$$

$$s.t.\ e_m \in \{0, E_m\},\ z = y_m + y_f,\ y_m + p_m x_m \leq w_m e_m + R_m + (1 - a_f)(w_f e_f + R_f)$$

where p_m is the price of the husband's private good, w_m is the wage rate for his work outside the home and R_m is his unearned income. The husband controls the remaining part of his wife's income, $(1 - a_f)(w_f e_f + R_f)$.

The empirical portion of this paper considers the Hindu Succession Act in India, which greatly improved women's ability to inherit property. While the HSA thus increases the wife's unearned income at some unknown point in the future, we argue that if the wife can smooth her consumption by borrowing and saving in a multi-period setting, the HSA increases her unearned income in every period. Accordingly, in the static model

we consider in the paper for simplicity, we assume the HSA increases the wife's current unearned income, R_f, which then increases her autonomy $a_f(w_f e_f + R_f)$ and thus her effective wage $a_f w_f$ and potentially her labor supply.

To simplify the model, we introduce the following assumption to ensure the husband always works, so we can focus on studying the wife's labor supply.

Assumption 1 (A1): parameters β_m, γ_m and δ_m satisfy

$$\frac{\beta_m + \gamma_m}{\delta_m} (= \frac{1}{\delta_m}) > \frac{w_m E_m + R_m + w_f E_f + R_f}{w_m (1 - E_m)}$$

The following lemma shows that (A1) ensures the husband always prefers to work. The table in appendix B.5 confirms 96.9% of men work in the data. Moreover in appendix B.5, we explain that intuitively if we relax this assumption, our model would predict that the HSA weakly decreases men's labor supply, and show suggestive evidence that this pattern is empirically true.

An equilibrium is *interior* if all continuous variables don't have corner solutions.

Lemma 2.1. *Suppose the Nash equilibrium is interior. In equilibrium, if (A1) holds, the husband always works ($e_m = E_m$).*

Besides an increase in the wife's unearned income, another impact of the HSA is a potential decrease in the unearned income of men whose sisters who are subject to the HSA. While this aspect of his exposure to the HSA depends on his sister's marriage timing (which does not necessarily coincide with his wife's exposure), on average men's unearned income still has decreased as a result of the HSA. Thus we consider theoretically two possible impacts of the HSA on a household: Proposition 2.2 considers an increase in the wife's unearned income with an equivalent decrease in the husband's unearned income, so that the household's total unearned income remains the same. This is consistent with the impact of the HSA on the society overall, where the total amount of inherited money remains the same and the HSA changes the allocation rule. Proposition 2.4 considers an increase in the wife's unearned income when the husband's unearned income remains constant, which is consistent with the impact of the HSA on households whose treatment status is defined by the wife's exposure. (Both proofs are in Appendix A.)

Proposition 2.2. *Suppose the Nash equilibrium is interior and (A1) holds. In equilibrium, keeping the total unearned income constant, an increase in the wife's unearned income:*

- *Weakly increase her labor supply (e_f).*
- *Weakly increase the household public good (z).*

An increase in the wife's ability to inherit property, together with an equivalent decrease in the husband's inheritance, increases the likelihood that she works outside the home. This is because her effective wage $a_f w_f$ gets higher. The wife (weakly) increases her expenditure on consumption and increases her contribution to the household public good, while as the husband controls less of the wife's income, he contributes less to the household public good.[5] Overall when the wife starts to work outside the home, the household total income increases, so the total contribution to the household public good increases.

A woman's gains from working, and thus, the effects of the HSA, depend on her potential wage w_f, which likely varies across women. This heterogeneity helps distinguish our model from alternate channels linking the HSA to labor supply (which predict stronger effects for different values of w_f) and affect the implications of the model on the overall economy. To characterize this heterogeneity, we aggregate the individual level result in Proposition 2.2 to the society level. Specifically, we consider a society where the wife's baseline unearned income is a random variable. We maintain the assumption that it follows a normal distribution with mean μ, $R_f \sim N(\mu, \sigma^2)$, for expositional clarity.[6] According to Table 2, only 36% of women work, so we maintain the assumption that μ is sufficiently low such that less than one half of women work even after the increase in their unearned income. In other words, we assume $\mu + \triangle$ is smaller than the threshold t, where $\triangle$ is the change in their unearned income and t is the threshold of the change from not working to working.[7]

Claim: In Proposition 2.2, the aggregate increase in female labor supply is higher for high-paying jobs.

The following example visualizes the results in Proposition 2.2 and its claim.

[5]Note that other through increases in the wife's labor supply from the autonomy effect, there is no income effect when the wife gets more unearned income (holding the household's unearned income constant). To clarify this, consider a pure transfer, $\triangle$, from the husband to the wife (keeping the autonomy constant to highlight the income effect). In an interior equilibrium, the optimal strategy is that the wife spends the entire increase $\triangle$ on the household public good and the husband spends $\triangle$ less, since each spouse needs to get the same marginal utility from spending the last dollar on his/her own consumption and spending on the household public good. So the household public good changes in the same direction as both spouses' consumption, and with a fixed household budget, it has to be constant. Thus through the household public good, a transfer to the wife won't make her truly wealthier nor reduce her labor supply. So there is only an autonomy effect in Proposition 2.2.

[6]The results (including two claims, single women and women in collective households) hold for any distribution with a mean μ and a density f(x), as long as if $\mu < x < y$, $f(x) > f(y)$.

[7]When there is only one possible change, including Proposition 2.2, single women and women in collective households, we maintain the assumption that $\mu + \triangle$ is smaller than the threshold of the change. In Proposition 2.4, where there are two possible changes and two thresholds, we assume $\mu + \triangle$ is smaller than both of them.

Example 2.3. *An example illustrating the changes of female labor supply when the wife's unearned income increases, when the total unearned income is constant.*[8]

Figure 1 shows the following patterns of the equilibrium:
(a) If the wife's unearned income is lower than some threshold (t_0), there is an equilibrium where she doesn't work, and if it is higher than some other threshold (t_E), there is an equilibrium where she works. The top panel shows these two threshholds as a function of a woman's wage. These two thresholds are not necessarily the same, so we may have multiple equilibria (with low wage) or no equilibrium (with high wage). The bottom panel illustrates how each of these possible outcomes varies with unearned income for three specific wage levels.
(b) Because of the non-uniqueness of the equilibrium, without loss of generality we assume women work only if it is the unique equilibrium, i.e. $t = \max(t_0, t_E)$.[9] If her unearned income increases passing the threshold t, her labor supply increases, and otherwise, her labor supply remains constant.
(c) If the wife's unearned income increases by $\triangle$, the fraction of women who start to work outside the home is $F(t) - F(t - \triangle)$, where $F(x)$ is the c.d.f. of a normal distribution with mean μ and variance σ^2. This fraction is higher when $t - \frac{\triangle}{2}$ is closer to the mean. Given $t - \frac{\triangle}{2}$ is greater than the mean, lower t makes it closer to the mean, and so the threshold (t) decreases with the wife's wage, as illustrated in the figure. Thus higher wage leads to lower threshold, and then higher increase in female labor supply. Intuitively, the higher a woman's potential wage, the greater is the increase in the effective wage $a_f w_f$ from a gain in her autonomy. [10]

On the other hand, suppose the wife is subject to the HSA, but the husband has no sisters subject to the HSA. Then household unearned income increases, and our predictions on labor supply change:

Proposition 2.4. *Suppose the Nash equilibrium is interior and (A1) holds. In equilibrium, keeping the husband's unearned income constant, an increase in the wife's unearned income:*

- *Increase her labor supply (e_f) if her unearned income increases from low to mid-level, and decrease it if her unearned income increases from mid-level to high, i.e. inverse U shape.*

[8] Parameters can be freely chosen as long as the Nash equilibrium is interior and (A1) holds. For example in the figure, $\beta_f = 1/11$, $\gamma_f = 10/11$, $\delta_f = 1/2$, $\beta_m = 11/21$, $\gamma_m = 10/21$, δ_m ensures (A1), $w_m = 3$, $E_m = 1/3$, $E_f = 11/36$, $R_m + R_f = 6$, and $\alpha_f = 1$. Low wage is 3.44, medium wage is 4.58 and high wage is 6.87.

[9] Alternatively, we can assume one half of the women work and the other half don't when the equilibria are not unique, so $t = (t_0 + t_E)/2$. The logic of the paper goes through with this alternative t.

[10] Note that if the increase in women's unearned income is positively correlated with their wage, i.e. $\triangle(w_f)$ is high for high w_f, which would happen if wealthy women have received more human capital investments, the positive correlation of women's wage and their increase in labor supply is even stronger.

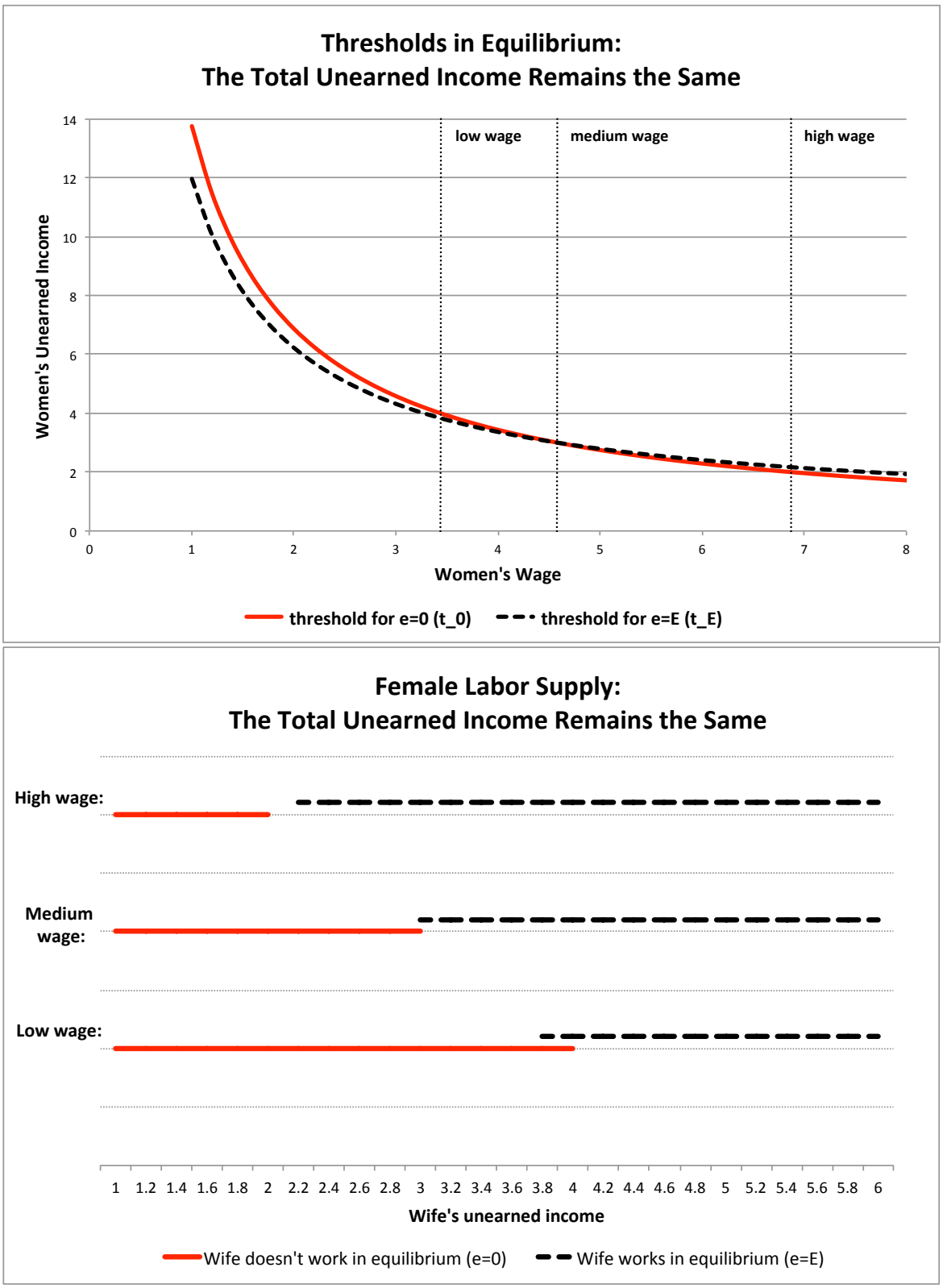

Figure 1: Female labor supply change and its threshold, when the wife's unearned income increases and the total unearned income is constant.

- *Otherwise, keep her labor supply constant.*
- *Increase the household public good (z) unless e_f's decrease dominates R_f's increase.*

A pure increase in the wife's ability to inherit property has two effects on her labor supply – an income effect and autonomy effect – and they move the wife's labor supply in opposite directions. With an income effect, an increase in her unearned income decreases her labor supply, because she would like to spend more time on leisure. With an autonomy effect, an increase in her autonomy would increase her labor supply, because her effective wage is higher. The overall change in the wife's labor supply depends on which effect dominates. If the wife's wage or wealth is low, her gain in autonomy is small. If the wife is sufficiently wealthy, income effects dominate increases in effective wage. In both cases, the wife prefers not to work outside the home. Thus, the wife goes out to work only if her wage is sufficiently high and her wealth is mid-level.

Furthermore, a pure increase in the wife's ability to inherit property would increase the household's total income, while the husband's wage remains the same. Similar to Proposition 2.2, as long as the wife doesn't decrease her labor supply, the total contribution to the household public good increases.

Claim: In Proposition 2.4, the aggregate change in female labor supply is always non-negative and higher for high-paying jobs.

We illustrate Proposition 2.4 and its claim with the following example:

Example 2.5. *An example illustrating the changes of female labor supply when the wife's unearned income increases.*[11]

Figure 2 shows the following patterns of the equilibrium:
(a) If the wage is sufficiently low, the wife never works in equilibrium. Otherwise, her labor supply exhibits an inverse U shape: she doesn't work when her unearned income is low or high ($R_f < t_{0L}$ or $R_f > t_{0H}$), and she works when it is mid-level ($R_f \in (t_{EL}, t_{EH})$).
(b) As before, we assume the women work only if it is the unique equilibrium, such that $t_L = \max(t_{0L}, t_{EL})$ and $t_H = \min(t_{0H}, t_{EH})$. If her unearned income increases passing the lower threshold t_L, her labor supply increases, if passing the higher threshold t_H, her labor supply decreases, and otherwise, her labor supply remains constant.
(c) The aggregate change in female labor supply is

$$(F(t_H - \triangle) - F(t_L - \triangle)) - (F(t_H) - F(t_L))$$

[11]Same as Example 2.3 except $R_m = 2$ replaces $R_f + R_m = 6$. Low wage is 2, medium wage is 3.27 and high wage is 3.6.

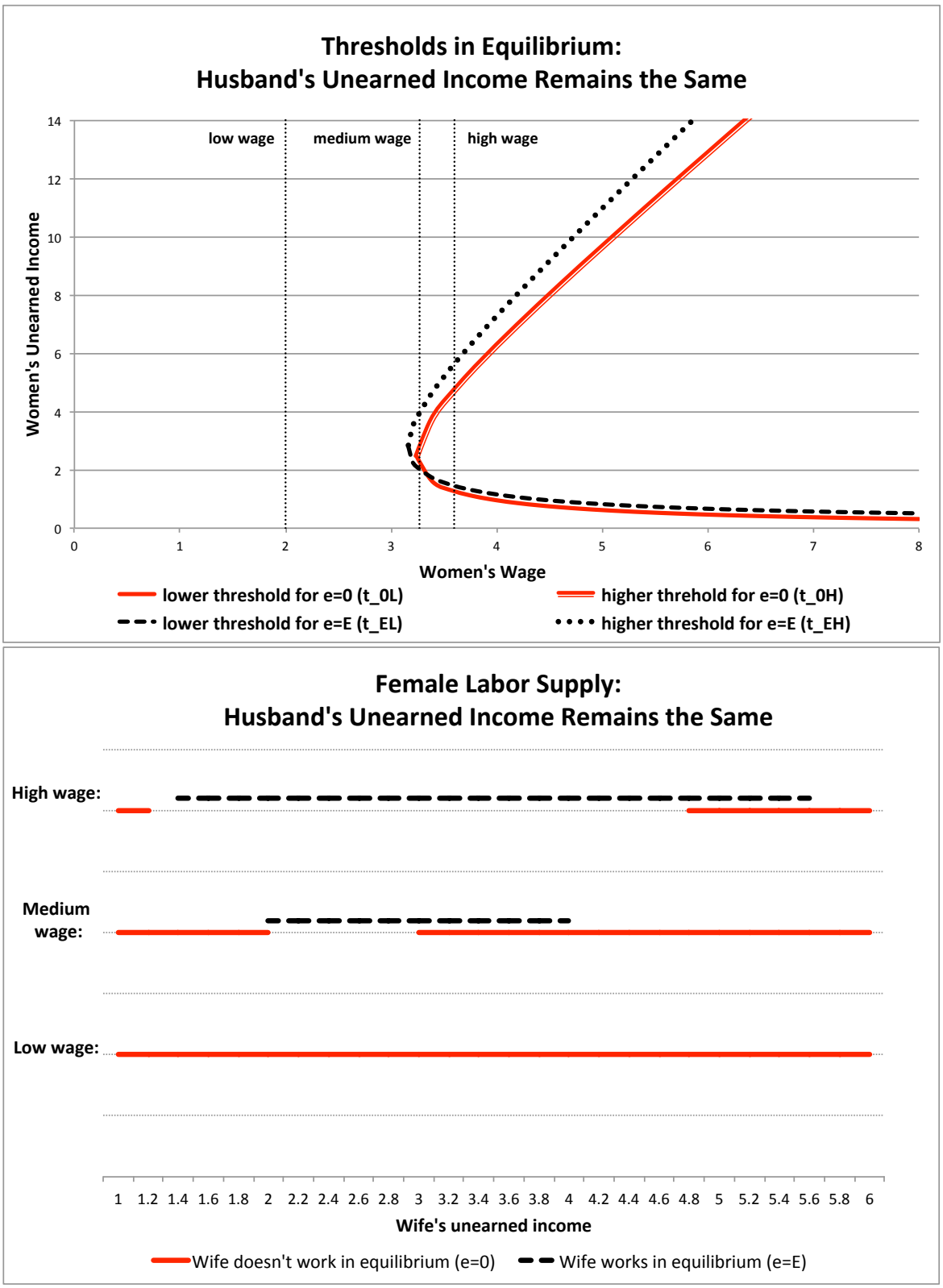

Figure 2: Female labor supply change and its threshold when the wife's unearned income increases and the husband's unearned income remains the same.

Since $t_H \geq t_L \geq \mu + \triangle$, $F(t_L) - F(t_L - \triangle) \geq F(t_H) - F(t_H - \triangle)$, so the aggregate change is non-negative. From the figure, t_L decreases with her wage and t_H increases with her wage. When her wage is higher, t_L is lower implying $F(t_L) - F(t_L - \triangle)$ is higher, and t_H is higher implying $F(t_H) - F(t_H - \triangle)$ is lower, thus the overall increase is higher.

Lastly, we remark on three further effects of the HSA on efficiency, households with the wife not subject to HSA, and single women.

Remark 1: There is usually an efficiency loss in a non-cooperative household model. In our model, this inefficiency is caused by both a positive externality of the household public good and the wife's lack of control over her income. As the wife's bargaining power goes up, efficiency could increase. For instance in Proposition 2.2, both the wife and the husband could be better off, even though the household's total unearned income remains the same. This is because as the wife's unearned income increases, she has a higher control over her income, and thus she is more likely to work outside the home. Both parties benefit from the increase in the wife's earning.

Remark 2: There is another type of households where the wife is not subject to the HSA (no change to her unearned income), but the husband's unearned income decreases when his sister is qualified. In this case, the wife is more likely to work outside the home due to an increase in her autonomy and a decrease in the husband's wealth, while the supply of the household public good could decrease.

Remark 3: Finally, it is easy to see that there is only an income effect on single women, and thus they are less likely to work outside the home if their ability to inherit property increases. Aggregately, the decrease in female labor supply is stronger for low-paying jobs. Intuitively, it is easier for the income effect to make women stop working if they weren't earning much from working anyway.

Summary of Testable Implications

The table below summarizes our model's testable implications of an increase in the wife's unearned income (R_f):

	Proposition 2.2 ($R_m + R_f$ constant)	Proposition 2.4 (R_m constant)
Wife's labor supply (e_f)	Constant or Up (Up, likely if w_f high)	Constant, Up or Down (Up, likely if w_f high)
Household public good (z)	Same as e_f	Up, unless e_f decreases
Single women's labor supply	Constant or Down (Down, likely if w_s low)	Constant or Down (Down, likely if w_s low)

We close the theoretical session with a comparison with the collective household model.

Alternative Model: Collective Household Model

In the collective model, the wife and husband maximize the weighted total utility: $U = a_f u_f + (1 - a_f)u_m$. The optimization problem becomes

$$\max_{x_f, x_m, e_f, e_m, z} a_f(\beta_f ln x_f + \gamma_f ln z + \delta_f ln(1 - e_f)) + (1 - a_f)(\beta_m ln x_m + \gamma_m ln z + \delta_m ln(1 - e_m))$$

$$s.t.\ \ e_f \in \{0, E_f\},\ \ e_m \in \{0, E_m\},\ \ 0 \leq x_f, x_m, z$$

$$z + p_f x_f + p_m x_m \leq w_m e_m + R_m + w_f e_f + R_f$$

Similar as before, we focus on the case where the husband always works. The following assumption ensures it.

Assumption 2 (A2): parameters satisfy

$$\frac{a_f(\beta_f + \gamma_f) + (1 - a_f)(\beta_m + \gamma_m)}{(1 - a_f)\delta_m} = \frac{1}{(1 - a_f)\delta_m}) > \frac{w_m E_m + R_m + w_f E_f + R_f}{w_m(1 - E_m)}$$

Proposition 2.6. *In this collective model, suppose the Nash equilibrium is interior and (A2) holds. In equilibrium, an increase in the wife's unearned income:*

- *Weakly decrease her labor supply (e_f).*
- *Keep the husband's labor supply constant, i.e. $e_m = E_m$.*
- *Increases the household public good (z) if the wife cares more about it than the husband ($\gamma_f \geq \gamma_m$), unless the decrease in e_f is sufficiently high.*

As the wife's unearned income increases, her autonomy (the weight on her utility, a_f) increases, and thus her utility is more important in the total weighted household utility. As a result, the wife could consume more, work less and enjoy more leisure. The wife's

increased consumption may come from the increase in the unearned income or the decrease in the husband's consumption (when $R_f + R_m$ is constant). At the same time, the wife is likely to work less and enjoy more leisure as her utility gets more important.[12] If the wife puts a higher weight on the household public good than the husband ($\gamma_f \geq \gamma_m$), as the weight on her utility goes up, the expenditure on the household public good could go up. Aggregately, the decrease in female labor supply is stronger for low-paying jobs. Intuitively, it is easier for the increased value in her leisure to make women stop working if they weren't making much from working.

To summarize, the noncooperative model and the collective model give very different predictions about the HSA's effect on labor supply. If the noncooperative model is correct, we may observe an overall increase in female labor supply, while if the collective model is correct, we will observe an overall decrease in female labor supply. Therefore, our finding the HSA increases female labor supply also suggests that households in India bargain noncooperatively rather than collectively.

3 Empirical Strategy

3.1 Background on the Hindu Succession Act

Here we give a brief overview of the legal reforms that we use for identification. For more detail comparing gender-specific property rights before and after the reform, see Roy (2013) or Deininger, Goyal and Nagarajan (2013). Succession in India was traditionally governed by the *Mitakshara* system, which made a distinction between individual (also called separate or private property) and joint property, which included land and other ancestral assets. Individual property could be bequeathed at will, but joint property was doled out among a group of coparceners, which typically included only male relatives. Daughters or widows were allowed to inherit ancestral property from their fathers or late husbands only in the absence of male heirs. Since joint family property is the vast majority (97 percent) of total property (Roy, 2013), laws governing its succession are extremely important determinants of asset ownership.

The Hindu Succession Act of 1956 unified different traditional schemes and clarified women's rights to inherit private property, but continued to leave women out of the inher-

[12]The collective household model predicts a possible decrease in the wife's labor supply, even if working itself gives the wife a positive utility. The intuition could be seen as follows. In general, the husband gets more utility when the wife works more, so as the husband's weight is higher, the wife works more. Then as the wife's weight gets higher, the wife works less even if working is valuable to her. This is because the wife over-works when her weight is low.

itance of joint property.[13] Sons, by contrast, were given a direct right by birth to belong to the coparcenary and thus inherit joint property. Membership in the coparcernary granted other benefits, such as the ability to demand partition of joint property (e.g. a house), whereas daughters could not (Roy, 2013). These rules applied to men dying intestate (without a will), but 65 percent of Indians do so (Agarwal, 1994).

However, the Indian constitution grants both the federal and state governments legislative authority over inheritance, and in subsequent years, various states (specifically Kerala in 1976, Andhra Pradesh in 1986, Tamil Nadu in 1989, Maharashtra and Karnataka in 1994) enacted amendments that explicitly made daughters coparceners. These reforms only applied to women who are Hindu, Buddhist, Sikh or Jain, and only to women who were not yet married at the time of the reform. These amendments indeed had large effects on women's ability to inherit land: they caused the proportion of eligible women who have inherited land to increase by 15 percentage points, a very large increase, relative to the baseline level of 6 percent in non-reform states (Deininger, Goyal and Nagarajan, 2013). In 2005, the amendment was ratified nationally.

3.2 Identification Strategy

3.2.1 Instrumental Variables

Treatment effects for a program that is rolled out over space and time (such as the HSA) are typically estimated using an OLS regression of an outcome variable on a dummy variable capturing exposure to the program, conditioning on location and time fixed effects. However, in this case, exposure to the program is determined by year of marriage, which is an endogenous choice. Then if the timing of marriage responded to the HSA, our estimates of treatment effects would capture this selection.[14] Accordingly, we estimate treatment effects of the HSA using an instrumental variable approach that uses only variation in a woman's religion, year of birth, and state (which are predetermined at the time of the reform) to predict her exposure to the treatment. Thus, younger Hindu women in earlier adopting states will be predicted to be very likely to be subject to the HSA.

[13]The inheritance rights of Muslim women, who form the majority (78 percent) of women in the non-treated religions, are governed by the the Muslim Personal Law (Shariat) Application Act of 1937, which also strongly favors male heirs. Among other discriminatory aspects, women can only inherit land if no male heirs are available . The inheritance of Indian Christians (who represent 14 percent of women whose religions were not covered by the HSA) has traditionally been governed by either local customary law or English law (Khan, 2000).

[14]Indeed, section 5 and Deininger, Goyal and Nagarajan (2013) find effects of the HSA on marriage timing. While a mean shift in the age of marriage would not necessarily bias the estimates of the HSA on labor supply, if there is differential change based on individual or household-level characteristics that also affect labor force participation, OLS estimates of treatment effects would be biased.

Specifically, we consider an outcome y for woman i of religion r, born in year τ in state j. We consider religion to be a binary variable equal to 1 if the woman is a treated religion (Hindu, Buddhist, Sikh, or Jain) and 0 if the woman is not treated (Muslim, Christian, or other). A woman is classified as treated if she is a treated religion and married for the first time after the HSA.[15] In the first stage, that woman's treatment status ($T_{ijr\tau}$) is instrumented by fixed effects for each religion-year of birth-state cell:[16]

$$T_{ijr\tau} = \delta_{jr\tau} + v_{ijr\tau} \tag{1}$$

This specification ensures that, while exposure to the treatment is determined by a woman's (endogenous) age at marriage, we are only using variation in year of birth to isolate exogenous variation in exposure to the treatment.

We then assume that a woman's outcome is a function of her fitted probability of treatment, as well as fixed effects for year of birth, religion, and state and double interactions between year of birth and religion, year of birth and state, and state and religion:

$$y_{ijr\tau} = \beta \hat{T}_{ijr\tau} + \theta_\tau + \nu_r + \psi_j + \gamma_{r\tau} + \lambda_{j\tau} + \mu_{jr} + \varepsilon_{ijr\tau} \tag{2}$$

The exclusion restriction for the instrumental variables (the set of fixed effects $\delta_{jr\tau}$) is that, after allowing for there to be religion-specific differences in outcome by both state and year of birth, as well as state-specific year of birth effects, there cannot be differential variation by religion in state-specific year of birth effects. That is, we are ruling out factors that increase Hindu women's labor supply in areas that just got the treatment among ages that are especially likely to be subject to the treatment. This assumption seems plausible. It is true that some states within India have recently promoted policies that directly affect women such as political reservations, or policies that indirectly affect women such as trade reforms (Menon and Rodgers, 2009), and this liberalization could be correlated with the passage of the HSA. While it possible that these policies may have religion or age-specific effects, we have no reason to believe that they would have differential effects on

[15] Therefore, our treatment definition does not include women who were married for the first time before the HSA but are subject to the HSA because they were remarried after it; we only estimate the effects of exposure to the HSA in a woman's first marriage. Our instrumental variable strategy is not well suited to modeling remarriage decisions, since it predicts marriage based on age. A further concern with considering remarried women to be treated is that a decision to divorce and remarry may have been driven by the desire to become eligible for the HSA. In any case, remarriage is rare; only 2.2 percent of married women in the sample have been married more than once.

[16] That is, there are 2088 dummies (29 states $\times$ 36 years of birth $\times$ 2 religions). Stock and Yogo (2002) point out that the standard F-statistic of 10 considered to be a reassurance against weak instruments (Staiger and Stock, 1997) is too low if there are many instruments. However, the F-stat from the joint test of significance in our first stage is 111.39, so weak instruments do not seem to be a major concern in our case.

young Hindu women specifically.

While the HSA may have spillover effects on the labor supply of the control groups (namely, married Hindu women or non-Hindu women), it is unlikely that these effects by themselves could generate a positive coefficient on the treatment variable. Some of these spillovers would increase the labor supply of all Hindu women and thus cause our estimated treatment effect to be an underestimate of the true effects of the HSA. For instance, our theoretical model predicts that untreated women whose husbands lose unearned income when their sisters gain eligibility would increase their labor supply (remark 2 in section 2).[17] While it is possible that increased labor force participation of treated women may depress female wages (especially if the demand for female labor is relatively inelastic) and thus decrease the labor supply of non-treated women, these effects would only be present if there is indeed a true effect of the treatment on women who are subject to it. Therefore, even if these wage spillovers affect the magnitude of the estimated coefficient, they cannot singlehandedly explain the qualitative effect.

3.2.2 Cohort comparison

While our main identification strategy is the instrumental variables strategy described in the previous subsection, we also provide results using an analogous OLS estimation strategy that compares younger cohorts likely to be subject to the HSA with older cohorts in the same states who were likely to have been married by the time the HSA passed and thus not be subject to it. That is, we consider treatment cohorts to be girls younger than age 14 (the 10th percentile of the age-at-marriage distribution for females) at the time of the reform to girls over age 23 (the 90th percentile of the distribution) at the time of the reform.[18] A similar strategy has been used in previous studies of education reforms to compare children of school age at the time of reform to older children who would have completed their schooling decision at the time of the reform (Duflo 2001; Osili and Long 2008).

In our case, we can also use variation across religions for identification; specifically, we conduct a difference-in-difference test that tests whether the difference between older and younger cohorts is greater among Hindus than non-Hindus. So the estimated treat-

[17] Or married Hindu women may choose to work more so that their daughters can inherit property in the future. This could be represented in the context of our model as a link between the HSA and all Hindu women's gains from private consumption β_f.

[18] The results are very similar if we use other cut-offs for defining treatment and control cohorts, such as considering women under age 15 at the time of the reform to be treated and those over age 20 to be control. Similarly, the results are almost identical if we only include women up to age 30 in the control cohort, to maximize comparability with the treated, younger women.

ment effects are now given by the interaction between $TreatedCohort_{ijr\tau}$ and $Hindu_{ijr\tau}$, conditional on state and year-of-birth fixed effects:

$$y_{ijr\tau} = \beta_1 TreatedCohort_{ijr\tau} + \beta_2 Hindu_{ijr\tau} + \beta_3 TreatedCohort_{ijr\tau} \times Hindu_{ijr\tau} + \delta_j + \gamma_\tau + \varepsilon_{ijr\tau} \tag{3}$$

β_3 is an unbiased estimator of the true treatment effect if there is nothing that differentially affects the labor supply of Hindu women in treated cohorts. As we argued earlier, while many societal factors (which may vary by state) may differentially affect young women in India, we have little reason to believe that these factors vary by religion.

While the estimated treatment effect is an intent-to-treat effect (since women in the treatment cohorts who marry very young would not have been exposed, and women in the control cohorts who marry very late would have been exposed), by construction, these instances are minor. That is, only about 10 percent of the treatment cohorts married young enough to be exempt from the HSA, and only 10 percent of control cohort late enough to be subject to it. This fact allows us to compare not only the qualitative effect but also the magnitude of the estimated treatment effect between the OLS and IV strategies.

3.3 Data

We use the 2005-2006 National Family Health Survey of India. There are several advantages to using this survey. First, and most importantly, the survey includes year of marriage, state of residence, and religion, allowing us to know a woman's treatment status ($T_{ijr\tau}$) in equation (1) under the assumption that the state of her current residence is the same as her state of birth. The data is nationally representative and has a relatively large sample size (87,857 currently married women), giving power to our identification strategy that uses variation across state-religion-year of birth cells. There are also questions that measure a woman's autonomy and decision-making power within a household, which we use to bolster our argument that autonomy is the mechanism relating the inheritance reform to women's labor supply. Finally, anthropometrics and measures of anemia are available for adult women and children under five. We use these measure to estimate the effects of the HSA on children's health as a test of model's predictions on household public goods and test whether improvements in women's or children's health is an alternative channel linking the HSA and female labor supply.

Our main outcome variable of interest is a binary variable for whether a woman has worked in the past seven days. This variable was defined based on a very broad definition

of work that includes any income-generating activity done in the past seven days.[19] We also examine specific types of labor supply, namely:

- Whether the woman works for herself, a family member, or someone else. These categories are mutually exclusive.
- Whether the woman receives no pay, or works for cash or in-kind payment. While no pay is mutually exclusive from the other categories, it is possible that a woman could report working both for pay and in-kind.
- Whether the woman works all year, or occasionally. These categories are mutually exclusive.
- Whether the woman works away from home.
- Whether the woman works in several mutually exclusive job categories: professional/technical/managerial; clerical/sales/service; manual (skilled or unskilled); and agriculture.

All together, we examine fourteen labor supply outcomes. While some studies examining a large number of outcomes construct an index of these outcomes to assuage readers' concerns about multiple testing, such an index would impose a constant effect of the HSA on each outcome in the index. By contrast, our theoretical model predicts that higher paying jobs could be differentially more affected than lower paying jobs. Accordingly, we examine the outcomes individually, and argue that the overall pattern of the results is extremely unlikely to be due to chance.

We also use women's reports of who makes the decisions in the household and whether she can go to certain places alone as measures of her autonomy. Specifically, we assess a woman's decision-making ability using her answers to the question: "Who makes decisions about [X] in your household?". The decisions asked about were: the woman's own health care, large household purchases, visits to family or relatives, purchases for daily needs, and spending a husband's earnings. We construct variables that capture whether the wife has no say in each decision. Another important dimension of autonomy is whether the woman can go certain places without needing an escort. Accordingly, we use the woman's self-reported answers as to whether she can got to the market, a health facility and leave the village alone. Since all of these locations present opportunities to

[19]The exact question was: "As you know, some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business or work on the family farm or in the family business. In the last seven days, have you done any of these things or any other work?"

spend money, the fact that a woman can go there alone reflects her ability to control household purchases (the a_f parameter in the theoretical model). Finally, to capture financial autonomy, we use a binary variable for whether the woman has access to a bank account.

Table A1 presents summary statistics for the woman in our estimation sample (broken down by whether their husbands appear) and the men in the sample. The differences between women whose husbands appear and those who do are very small in magnitude. Many women report having no say in household decisions, particularly important ones: 47.1 percent of married women report having no say in large household decisions. Fewer women report no say in their own health care (37.7 percent), in determining visits to family (39.9 percent), or in making purchases for daily needs (39.5 percent).[20] Interestingly, women have the most say in decisions of how to spend their husband's income: only 31.7 percent of women have no say in how that income is spent. Also noteworthy is the fact that men on average report that their wives have more decision-making power than their wives report; for instance, only 26.9 percent of men say that their wives have no say in large household purchases. Many women also report an inability to go places alone, especially to places outside the village (only 39.3 percent of women can leave the village alone). About half of the women surveyed report that they are not allowed to go to the market or a health facility alone. Only 15.3 percent of women have access to a bank account.

While male labor force participation is almost universal, only 36 percent of women report having worked in the last seven days. Those who do work are likely to work for a family member (45.8 percent of women) than for themselves (14.7 percent) or a non-family member (39.4 percent). Most work all year (65.8 percent) and for cash (67.1 percent). The most common profession is agriculture (60.3 percent of female workers), followed by manual work (20.8 percent), clerical/sales/service (12.7 percent) and professional (5.9 percent).

4 Results

We begin by confirming that the reform indeed increased a woman's autonomy, strengthening our argument that autonomy is the channel through which the reform affected labor supply. Table 1 presents results of an IV regression estimating the effects of the HSA on our measures of the woman's say in household decision-making, freedom of move-

[20] While there is undoubtedly correlation in these measures, the overlap is far from complete. For instance, of the women who report no say in visits to family, 28.3 percent indicate that they *do* have some say in purchases for daily needs.

ment, and access to a bank account.[21] While the HSA did not improve all measures of autonomy, the results broadly support the hypothesis that the HSA improved women's autonomy. Specifically, the program led to a statistically significant decrease of 6.6 percentage points in the probability that a woman has no say in household decisions. It also caused a statistically significant increase of 8.2 percentage points in the probability that a woman can go to the market alone, a 6.9 percentage point increase in the probability that a woman can go to a health facility alone, and a 8.3 percentage point increase in the probability that a woman can travel outside the village alone. There was also a borderline significant increase of 3.9 percentage points in the probability a woman has access to a bank account ($P = 0.120$). These results coincide with other estimates of the effects of women's property rights (Field 2003; Wang 2014) or inheritance rights (Harari 2013; Roy 2008) on her autonomy.

Table 2 examines the effects of the Hindu Succession Act on women's labor force participation. The first column indicates that the HSA increased the probability that a woman has worked in the last seven days by 6.8 percentage points. The next three columns show that the increase came from women working not for themselves or for family members, but for other people (an increase of 5.3 percentage points). The fact that self-employment did not increase provides evidence against intra-household credit constraints as the mechanism linking the HSA and women's labor supply: we see no evidence that expected unearned income provided by the HSA allowed women to more easily borrow the capital to start a new business.[22]

Other results confirm the pattern that the HSA increased women's labor supply into high-paying jobs outside the home. In particular, a woman is more likely to work all year (an increase of 5.7 percentage points) than occasionally and for cash (an increase of 6.1 percentage points) than for no pay or for in kind payment. In table 3 we examine which sectors drove the increase in labor supply. While we find positive (although statistically insignificant) effects on manual (skilled or unskilled) and clerical, sales, and service work, the largest (4.3 percentage points) and only statistically significant increase came in professional/managerial/technical employment.

Further evidence that supports the link between the HSA and women's labor supply is given in table 4, which reports OLS estimation results of the cohort comparison identifi-

[21] In all IV regressions, we present standard errors calculated from a bootstrap with 100 iterations. Each replicate draws a sample of primary sampling units to allow for intra-cluster correlation in standard errors. Results are very similar if we draw samples from state-year of birth-religion cell clusters or if we draw simple random samples in each replicate.

[22] Nutrition-based efficiency wage models may also predict that an infusion of capital would allow workers to eat enough calories to enter the labor force. However, these effects would be concentrated in activity-intensive work, such as agriculture, and we do not see effects in the agricultural sector.

DEPENDENT VARIABLE	Woman reports NO say in… own health care	large hh purchases	visits to family	purchases for daily life	spending husband's earnings	Woman can go alone to… market	health facility	places outside village	Woman has bank account
subject to HSA	0.016	-0.066*	-0.040	-0.036	0.024	0.082**	0.069*	0.083**	0.039
	[0.035]	[0.039]	[0.029]	[0.037]	[0.037]	[0.032]	[0.036]	[0.037]	[0.025]
Mean Dep Var	0.377	0.471	0.399	0.395	0.317	0.528	0.502	0.393	0.153
Observations	87,857	87,853	87,854	87,855	85,956	87,845	87,845	87,840	87,722
R-squared	0.073	0.096	0.112	0.117	0.074	0.171	0.141	0.134	0.065

*All regressions have the indicator variable for whether the woman was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table 1: IV Estimates of the Effects of the Hindu Succession Act on Autonomy

DEPENDENT VARIABLE		Work for…			Work regularity		Pay scheme: work for…			
	Work	self	family	another	occasional	all year	no pay	cash	in kind	Work away from home
subject to HSA	0.068**	0.020	-0.012	0.053*	0.001	0.057*	0.014	0.061**	0.001	0.047
	[0.033]	[0.014]	[0.028]	[0.031]	[0.015]	[0.033]	[0.013]	[0.027]	[0.028]	[0.035]
Mean Dep Var	0.360	0.062	0.200	0.166	0.103	0.275	0.106	0.251	0.177	0.343
Observations	87,857	87,857	87,857	87,857	87,857	87,857	87,857	87,857	87,857	87,857
R-squared	0.096	0.041	0.092	0.068	0.074	0.069	0.075	0.078	0.084	0.110

*All regressions have the indicator variable for whether the woman was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table 2: IV Estimates of the Effects of the Hindu Succession Act on Labor Supply

	Work in…			
DEPENDENT VARIABLE	professional / managerial / technical	clerical / sales / service	manual	agriculture
subject to HSA	0.043***	0.018	0.030	-0.027
	[0.012]	[0.016]	[0.021]	[0.034]
Mean Dep Var	0.0227	0.0483	0.0842	0.2717
Observations	87,857	87,857	87,857	87,857
R-squared	0.025	0.027	0.038	0.100

*All regressions have the indicator variable for whether the woman was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table 3: IV Estimates of the Effects of the Hindu Succession Act on Sector of Work

cation strategy given in equation 3. Reassuringly, the results are very similar. We find that while Hindu women are generally more likely to work than non-Hindu women (the coefficient on the Hindu dummy is 7.8 percentage points), this effect is 9.7 percentage points stronger in treated cohorts. As with the IV results in table 2, the overall labor supply effect is driven entirely by women working for people other than themselves or family members, work done all year round and for payment in cash.

We also estimate the effects of the HSA on the labor supply of single women. Our model suggests that the HSA should lower their labor supply, since they are exposed to its income effect but not an autonomy effect.[23] A complication is that the HSA had been adapted nationwide at the time of the survey, so that all currently single women were exposed to it by construction. So we cannot use our IV or cohort-comparison strategies, which predict women likely to be treated based on age, religion, and state, since all Hindu single women are treated. However, we can still provide suggestive evidence by using a difference-in-difference strategy that compares the labor supply of married and

[23]For single women living with their parents or other relatives, the HSA may still increase their autonomy vis-a-vis other household members if intra-household bargaining takes place in these households. Still, we argue that the autonomy effect is still likely to be stronger for married women.

DEPENDENT VARIABLE		Work for…			Work regularity		Pay scheme: work for…			
	Work	self	family	another	occasional	all year	no pay	cash	in kind	Work away from home
Treated cohort	0.097***	-0.020**	0.017	0.090***	0.023**	0.097***	-0.038***	0.090***	-0.004	0.050**
X Hindu	[0.020]	[0.009]	[0.015]	[0.015]	[0.009]	[0.019]	[0.010]	[0.016]	[0.014]	[0.020]
Hindu	0.078***	0.027***	0.071***	0.006	0.038***	0.030***	0.065***	0.052***	0.052***	0.136***
	[0.013]	[0.005]	[0.010]	[0.009]	[0.007]	[0.011]	[0.009]	[0.010]	[0.009]	[0.013]
Treated cohort	-0.078***	0.024**	-0.008	-0.090***	-0.020*	-0.084***	0.044***	-0.074***	0.001	-0.051**
	[0.022]	[0.011]	[0.017]	[0.017]	[0.011]	[0.021]	[0.011]	[0.019]	[0.015]	[0.021]
Mean Dep Var	0.360	0.062	0.200	0.166	0.103	0.275	0.106	0.251	0.177	0.343
Observations	66,535	66,659	66,659	66,659	66,659	66,659	66,659	66,659	66,659	66,659
R-squared	0.059	0.03	0.07	0.043	0.053	0.046	0.071	0.042	0.053	0.079

*Treated cohort equal to one if a woman who is age 14 or under at the the HSA was amended in her state and equal to zero if she was age 23 or above. (Age 14 is the 10th percentile of marriage age and age 23 is the 90th). The regressions also include controls for state and year of birth fixed effects. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Standard errors in brackets, clustered at the level of the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1.*

Table 4: Cohort-Comparison Estimates of the Effects of the Hindu Succession Act on Labor Supply

unmarried Hindu women to the difference in labor supply of married versus unmarried non-Hindu women, while keeping the fixed effects for year of birth interacted with Hindu to account for differential age trends by religion (as well as state interacted with religion and year of birth). The estimating equation is thus:

$$y_{ijr\tau} = \beta_1 Hindu_{ijr\tau} + \beta_2 Single_{ijr\tau} + \beta_3 Single_{ijr\tau} \times Hindu_{ijr\tau} + \theta_\tau + \nu_r + \psi_j + \gamma_{r\tau} + \lambda_{j\tau} + \mu_{jr} + \varepsilon_{ijr\tau} \quad (4)$$

The estimated β_3 compares the difference in labor supply between single and married Hindu women to the difference in non-Hindu women, thus estimating the effect of the HSA on single women under the identifying assumption that the HSA is the only differential determinant of labor supply between married and unmarried women in Hindu versus non-Hindu women. Since we cannot definitively rule out the presence of such factors, we interpret these results, given in table 5, as descriptive evidence in support of the model. While single women are more likely to work than married women in all religions, the difference is 6.5 percentage points lower among Hindu women, consistent with the model's prediction of a negative effect of the HSA on the labor supply of single treated women. There is also suggestive evidence supporting the model's prediction that the effects are particularly strong in low wage jobs: the largest decreases in single women's employment in Hindu women are in work for family (5.7 percentage points) and agricultural employment (5.4 percentage points).[24]

5 Alternative Mechanisms and Robustness Checks

5.1 Pre-marital investments and dowries

While we argue that the mechanism linking the HSA to female labor supply is intra-household bargaining, the HSA could potentially affect other characteristics of women, which in turn affect their labor supply. For instance, forward looking parents making human capital investments in their daughters might alter their investments based on the fact that their daughters are now legally entitled to inherit ancestral property. The direction of the effect is theoretically ambiguous. Future inheritances represent an increase in the total expected lifetime transfers to a daughter, so parents may reduce other investments to bring the total investment in their daughters closer to their preferred pre-reform allocation. However, if any human capital investments are complementary to inheritances (if, say, educated daughters can better manage family property), then human capital in-

[24]The results for single women for sector of work are given in appendix table A2.

DEPENDENT VARIABLE		Work for…			Work regularity		Pay scheme: work for…			
	Work	self	family	another	occasional	all year	no pay	cash	in kind	Work away from home
Hindu X single	-0.065***	-0.008	-0.057***	-0.019	-0.032***	-0.043***	-0.019***	-0.040***	-0.044***	-0.053***
	[0.014]	[0.007]	[0.010]	[0.012]	[0.006]	[0.014]	[0.007]	[0.013]	[0.010]	[0.013]
Hindu	0.357*	0.019	0.122	0.266***	-0.059	0.450***	0.064	0.334***	0.072	0.304**
	[0.201]	[0.066]	[0.194]	[0.102]	[0.155]	[0.142]	[0.084]	[0.114]	[0.194]	[0.120]
single	0.192***	0.048***	0.029***	0.116***	-0.007	0.203***	0.008	0.163***	0.030***	0.126***
	[0.012]	[0.007]	[0.009]	[0.011]	[0.005]	[0.012]	[0.005]	[0.012]	[0.009]	[0.012]
Mean Dep Var	0.364	0.064	0.190	0.174	0.286	0.096	0.098	0.255	0.173	0.338
Observations	124,122	124,385	124,385	124,385	124,385	124,385	124,385	124,385	124,385	124,385
R-squared	0.097	0.04	0.088	0.078	0.069	0.092	0.078	0.082	0.06	0.105

*All regressions include fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Standard errors in brackets : *** p<0.01, ** p<0.05, * p<0.1.*

Table 5: OLS Estimates of the Effects of the Hindu Succession Act on Single Women's Labor Supply

DEPENDENT VARIABLE	Age at marriage	Education	Height (cm)
subject to HSA	0.729**	0.609*	-0.672
	[0.285]	[0.330]	[0.430]
Mean Dep Var	17.16	4.31	151.83
Observations	87,857	87,852	84,236
R-squared	0.136	0.150	0.068

All regressions have the indicator variable for whether the woman was subject to the HSA instrumented Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, H birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and J in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnc
**** p<0.01, ** p<0.05, * p<0.1.*

Table 6: IV Estimates of the Effects of the Hindu Succession Act on Human Capital Investment in Girls

vestments may go up. Indeed, the empirical evidence on the Hindu Succession Act and human capital investment in girls has yielded mixed results. Rosenblum (forthcoming) argues that the HSA raises the cost to parents of having a girl, and finds empirically that the HSA increased female child mortality. By contrast, Roy (2013) and Deininger, Goyal and Nagarajan (2013) both find that the HSA increased the education of girls of schooling age at the time of the reform.

To address the possibility that human capital investments are driving the relationship between the HSA and female labor supply, we begin by assessing whether the HSA indeed appears to have affected the human capital of the women in our data. Specifically, we examine women's education, height, and age at marriage, using the identification strategy we detail in section 3.2. The results, presented in table 6, agree with the findings of Roy (2013), Rosenblum (forthcoming), and Deininger, Goyal and Nagarajan (2013). Specifically, we find that exposure to the HSA increased education by 0.61 years, similar to the effect of 0.37 years found in Deininger, Goyal and Nagarajan (2013) and of 0.50 years found in Roy (2013). We also find that age at marriage increased by 0.73 years as a result of the HSA, which again parallels closely the estimated effect of 0.59 years found in Deininger, Goyal and Nagarajan (2013). However, we also find that height by 0.67 centimeters (this effect is borderline significant; $P = 0.102$), paralleling the findings in Rosenblum (forthcoming) that the HSA lowers parents' health investments in their daughters.

Because there is no consistent empirical or theoretical pattern to these results, we do

not attempt to establish theoretically the direction in which changes in pre-marital investment would affect our results, compared to the effects of inheritance rights exogenously imposed on women whose human capital was already fixed. Instead, we reestimate the relationship between the HSA and women's labor supply, controlling for the measures of human capital investment that we investigated in table 6. These controls are of course endogenous, but it is nonetheless a useful thought exercise to consider the labor supply of women with the same human capital, but differences in exposure to the HSA. While we do not claim that our three human capital measures completely control for all dimensions of human capital investment that parents may make, appendix table A3 indicates that the estimated effects of the HSA actually increase slightly in magnitude and statistical significance after including these controls. This pattern then suggests that the ability to control for additional measures of human capital would be unlikely to destroy our results and may in fact even strengthen them.

One further lesson from this table is that the coefficients on education are negative across the regressions, as is height in many of them. While these results cannot be interpreted as causal, they help motivate the premise behind the theoretical model: there is a group of relatively well-off educated and healthy women who are not working, but presumably, could be.[25] This type of voluntary unemployment coincides with the women induced to work by the model, who take jobs that previously were available but undesirable to them.

Parents also presumably adjust a daughter's dowry based on her future ability to inherit property. As with pre-marital human capital investments, the theoretical direction of results is ambiguous. If dowries act as pre-mortem bequests, parents may adjust dowries downward in response to their daughter's future expected income gains and return to their preferred pre-reform expected lifetime transfers to their daughters. If parents were able to return completely to their preferred pre-HSA allocation of resources between children, however, we would not expect to see any effects of the HSA on outcomes after marriage. The fact that we find effects of the HSA on labor supply thus suggests this is not the case. On the other hand, Roy (2013) finds that parents increased both daughters' dowries and gifts to sons, arguing that parents subvert the HSA by giving *inter-vivos* transfers to their sons, but compensate their daughters with gifts around the time of marriage. In this case, dowries are another channel linking the HSA and a woman's unearned income, and simply reinforce our findings.

[25]By contrast, involuntary unemployment caused by minimum wages or other structural constraints would likely apply most severely to women with low education.

5.2 Marital matching

Another possible alternative model that could generate our results is if the HSA affected the characteristics of the husbands of exposed women, and this change in marital matching led to greater female labor force participation. Note that because the HSA was applied to all unmarried Hindu women in a state and marriages rarely take place across state borders or between religions, changes in average husband characteristics are relatively unlikely: essentially all potential wives would become subject to the law at the same time. Nonetheless, we still test whether the HSA led to any changes in husband characteristics – namely, his education and the age difference between him and his wife. Table 7 shows that there is no evidence that marriages after the HSA involved husbands of greater absolute education or closer in age to their wife. Since table 6 indicated that women subject to the HSA have more education and greater age at marriage, we control women's education and age at marriage in columns 2 and 4, respectively, but these controls do not affect the relationship between the HSA and husband characteristics. Thus, men seem to have responded to the fact that eligible women delay marriage by delaying marriage themselves, keeping the spousal age gap constant.

While the HSA does not appear to have changed average husband characteristics, it could still have lead to changes in the extent of assortative mating. This could happen if, say, the HSA increased wealthy men's desire to match with wealthy women, who now have better access to their family's wealth through inheritances. While we do not observe premarital wealth, we test whether marriages in which the wife is subject to the HSA have lower education gaps between spouses. Columns 5 and 6 of table 7 indicate that the HSA appears not to have changed the degree of assortative mating on education.[26]

5.3 Selective migration

Another potential identification concern is selective migration: what if women with high desire to work migrate to states that have passed the HSA when they decide to get married? While replacing dummies for current state of resident with dummies for state of birth in equation (1) would eliminate this concern, we unfortunately do not know a woman's state of birth. Reassuringly, however, while many women migrate at the time of marriage, this migration is rarely between states: in the 2001 Census of India, only 0.9 percent of women were interstate migrants (Castaldo, Deshingkar and McKay, 2012).

[26] Even if assortative mating did on some other dimension that we cannot test, we argue that this would most likely decrease female labor supply. If wealthy (and well educated) women are more likely to match with wealthy men after the HSA, income effects would dictate that these women would be even less likely to work than they were already (as seen in table A3).

	Husband characteristics				Assortative Mating	
DEPENDENT VARIABLE	Husband's education	Husband's education	Age difference between husband and wife	Age difference between husband and wife	Education difference between husband and wife	Education difference between husband and wife
subject to HSA	0.343	0.102	-0.239	-0.064	-0.059	-0.094
	[0.382]	[0.335]	[0.373]	[0.364]	[0.242]	[0.242]
wife's education		0.661***				-0.116***
		[0.005]				[0.005]
wife's age at marriage				-0.244***		
				[0.006]		
Mean Dep Var	6.962	6.962	5.650	5.650	3.196	3.196
Observations	87,857	87,857	87,857	87,857	83,869	83,869
R-squared	0.025	0.027	0.038	0.100	0.046	0.067

*All regressions have the indicator variable for whether the woman was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table 7: IV Estimates of the Effects of the Hindu Succession Act on Husband's Characteristics

Additionally, we know when a woman came to live in her current place of residence, and test whether women who came to the area before or at the time of marriage – who may have done so in response to the HSA – drive our result. As shown in appendix table A4, we find instead that the results are driven by women who came to their current place of residence after marriage.[27] While there is no guarantee that these women did not also move before marriage, they are still less likely to have done so than the women whom we know came to their current area before or at the time of marriage, and thus provide more reassurance that our results are not due entirely to selective migration. While our model does not directly explain why we might see stronger effects for women who have moved after marriage, one possibility is that they moved to areas with better job opportunities and thus would receive higher wage offers in our model, and thereby be more likely to be induced to work by the HSA.

5.4 Other channels linking autonomy to female labor force participation

Our model posits that the link between women's autonomy and her decision to enter the labor force is her ability to control her earnings: the a_f in our theoretical model that determines the fraction of a woman's income that enters her budget constraint is a function of her unearned income R_f. However, a woman's autonomy likely determines other outcomes within the household that a husband and wife may value differently, or arise from conflicts between a husband and a newly empowered wife. For instance, as discussed in section 1, other work has found effects of the HSA on domestic violence (Anderson and Genicot 2014; Mathur and Slavov 2013). It is theoretically possible, then, that these outcomes (rather than a woman's control over her earnings) are the mechanism linking autonomy to labor supply.[28]

As with premarital human capital investments, we begin by estimating the effects of the HSA on other intra-household outcomes in our sample, using our primary identi-

[27] This pattern is not driven by moves immediately after marriage (which may have actually taken place at the time of marriage if the timing of either or both events is measured with error): the effects of the HSA on labor supply remain driven by moves after marriage if we define moves in the year before or after marriage as at the time of marriage. Results available upon request.

[28] This logic also opens up the possibility that the HSA lead to more divorces, which would be another channel linking the HSA and women's labor supply if women begin working in anticipation of marital dissolution. Indeed, using our identification strategy, we find that the HSA has a positive marginal effect of 0.80 percentage points ($P = 0.101$) on the probability of divorce in our sample. While this effect large relative to the mean divorce rate – only 0.56 percent of ever married (non widowed) women are divorced – we argue that the fact that divorce is so uncommon suggests that women who begin working in anticipation of future divorce cannot by itself explain the entire labor supply effect that we see.

fication strategy detailed in section 3.2. Table 8 confirms that the HSA had impacts on fertility and women's and children's health. Specifically, in panel A we see that the HSA has decreased fertility by 0.52 children per woman. This result coincides with other research that finds that women in developing countries tend to prefer fewer children than men (Ashraf, Field and Lee, 2010), and can translate increased bargaining power into lower realized fertility (Klawon and Tiefenthaler 2001; Rasul 2008). Panel A also gives the effects of the mother's HSA exposure on the height, weight for height, and anemia of her children under the age of five. Note that this is a different effect than the parameter identified in the papers by Rosenblum (forthcoming), Deininger, Goyal and Nagarajan (2013), and Roy (2013), which find effects of the HSA on girls who will ultimately be subject to it (regardless of their mother's exposure). While mother's exposure to the HSA does not seem to have affected children's height or weight, it did lead to decreases in anemia, which were statistically significant for moderate anemia. Improvements in child health coincide with our model; both the noncooperative bargaining model and collective household model predict that women's unearned income increases investment in household public goods, such as children.[29] These results also fit within a large literature that relates women's unearned income or bargaining power to children's health (Duflo 2003; Beegle, Frankenberg and Thomas 2001; Maitra 2004; Allendorf 2007; Atkin 2009).

Finally, in panel B of table 8 we examine the effects of the HSA on women's health. While we do not find statistically significant effects on domestic violence, we find decreases in anemia (and a statistically significant and large decrease of 1.7 percentage points for severe anemia) and a gain of 0.754 points in a woman's body mass index (relative to a mean of 20.8). While there is less literature relating a woman's bargaining power to her own health, these results fit with the context of a household bargaining model in which women use increased bargaining power to redirect household to goods that they value more than their husbands do, such as their own health.[30]

If these other effects of the HSA increased women's labor supply, women's autonomy could still be the causal link between the HSA and labor supply, but the model we developed in section 2 would not apply. To provide evidence that a woman's control over her earnings is indeed the mechanism linking unearned income to labor supply, appendix table A5 examines the relationship between a woman's labor force participation and her health and fertility (columns 1, 3, 5, and 7).[31] A strong positive correlation be-

[29] Another explanation is that they have fewer children, but invest more in each child, as models of the quantity-quality trade-off predict.

[30] Of course, intra-household bargaining is not the only explanation for these effects. Income effects from the HSA could also contribute to these health improvements in the context of a unitary household model.

[31] For brevity, we show only the results for overall labor force participation and for the labor outcomes

PANEL A: Fertility and children's health

	fertility			health of children age 5 and under				
DEPENDENT VARIABLE	currently using contra-ception	currently pregnant	children	height[c]	weight / height[c]	mild anemia[b]	mod. anemia[b]	severe anemia
subject to HSA	0.014	0.005	-0.522***	0.0099	1.033	-0.037	-0.161*	-0.047
	[0.013]	[0.036]	[0.122]	[1.051]	[1.897]	[0.025]	[0.083]	[0.073]
Mean Dep Var	0.563	0.068	2.847	93.333	90.512	0.696	0.433	0.029
Observations	79,336	78,548	79,336	40,637	40,640	35,244	35,244	35,244
R-squared	0.188	0.073	0.392	0.119	0.069	0.103	0.099	0.039

PANEL B: Women's health

DEPENDENT VARIABLE	mild anemia[b]	mod. anemia[b]	severe anemia	bmi	bmi ≤ 18.5[a]	weight / height[c]	mod. domestic violence	severe domestic violence
subject to HSA	-0.003	-0.043	-0.017*	0.754**	-0.015	2.271	-0.046	-0.020
	[0.035]	[0.031]	[0.010]	[0.377]	[0.033]	[1.495]	[0.044]	[0.033]
Mean Dep Var	0.560	0.172	0.017	20.802	0.264	84.415	0.352	0.114
Observations	72,589	72,589	72,589	76,056	76,056	75,424	59,802	59,804
R-squared	0.046	0.026	0.016	0.134	0.053	0.104	0.080	0.037

(a) BMI ≤ 18.5 is considered underweight by the National Institutes of Health
(b) Mild anemia includes moderate and severe anemia, and moderate anemia includes severe anemia
(c) Weight for height and children's height measures are relative to a reference median of 100.
*All regressions have the indicator variable for whether the woman (for fertility or women's health) or mother (for children's health) was subject to the HSA instrumented by fixed effects for Hindu X (mother's) year of birth X state and include a dummy for Hindu and fixed effects for (mother's) year of birth, state, Hindu X (mother's) year of birth, Hindu X state, and state X (mother's) year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. Children's health regressions have controls for children's age as an additional control. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table 8: Effects of the Hindu Succession Act on Fertility and Women's and Children's Health

tween women's health and labor supply might suggest that health improvements are a

that we argue represent high-paying jobs: working for another person, for cash, and all year round. Other results available upon request.

potential channel linking the HSA to autonomy and women's labor supply. Ideally, we would estimate causal effects of these variables on labor supply in this population in order to estimate the effects of exogenous changes in them (due to the HSA). While, as with the pre-marital investments in table A3, we cannot do this, we control for wealth to eliminate one clear confounding variable (poor women are less healthy and need to work). Still, we find that healthier women (as measured by their current weight/height) are actually less likely to work than less healthy women of the same wealth, which suggest that health improvements that take place after marriage might actually work against finding a labor supply effect. These results parallel the findings in table 6 that taller women are less likely to work. The number of children is negatively correlated with the mother's labor force participation (conditional on wealth), and therefore could possibly work in the direction of finding an effect of the HSA, which decreased fertility. However, columns 2, 4, 6, and 8 test whether including the full set of controls for mother's health and fertility affect our estimation of the effect of the HSA on labor supply. These controls only increase the estimated treatment effect of the HSA, suggesting that our results are not driven by changes in fertility or women's health, and a complete set of health controls would again only further strengthen our results.[32]

Appendix table A6 additionally considers the relationship between children's health and their mother's labor supply. We find a somewhat mixed relationship between children's health and mother's labor supply. As with mother's health, even conditional on wealth, mothers of taller children or those with greater weight for height are less likely to participate in the labor force, although so are women whose children are severely anemic. Detailed data on children's health was only collected in a sub-sample of the respondents, so the sample size decreases by more than half, and the precision of our estimates decreases. Accordingly, when we reestimate IV effects of the HSA conditional on measures of child health, they are no longer statistically significant at conventional levels for most of the labor outcomes driving the main result. However, the coefficients go up again in magnitude and are consistently positive, suggesting that it is unlikely that improvements to children's health as a result of the HSA can explain the entire increase in female labor force participation that we find.

6 Conclusion

We find that the Hindu Succession Act, which improved women's ability to inherit property, increased their labor supply. Women exposed to the HSA were 6.8 percentage points

[32] We do not control for wealth in these regressions, since it changes in response to the HSA.

more likely to work; this effect was driven by jobs likely to be high-paying (working for a non-family member, for cash, and year-round). Our theoretical model explains that a woman's unearned income can increase her labor supply by raising her autonomy, which subsequently increases her gains from working.

By highlighting the relationship between control over household resources and labor supply, our results suggest that women's unearned income affects labor supply not just through income effects but through her ability to control decisions directly. So policies that affect the distribution of resources in the household – not just the inheritance laws that we study, but also other reforms to the legal system or targeted land titling programs – can affect the labor supply decisions of household members. Since labor supply is an important driver of firms' productivity and thus economic growth, our results also provide a new channel linking women's empowerment to economic growth. Previous literature has focused on the link between women's empowerment and human capital investments (Doepke and Tertilt, 2014) as a mechanism for this result.

Finally, our results suggest that there can be important multiplier effects to women's labor force participation. Since there is evidence that work causally increases a woman's autonomy (Anderson and Eswaran 2009; Atkin 2009), policies that seek to empower women can prompt newly empowered women seek out opportunities to earn money and become further empowered. The flip side of this compounding is that women with low autonomy have little to gain from earning money, resulting in a "disempowerment trap." Our results suggest that reforms to women's property or inheritance rights such as the HSA can propel these women into considerably better bargaining positions within the household.

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APPENDICES FOR ONLINE PUBLICATION

variable	all currently married women (N = 87,857)	currently married women with husband in survey (N = 39,254)	currently married men (N = 39,254)
wife no say in own health care	0.377	0.368	
wife no say in large household purchases	0.471	0.458	0.269[a]
wife no say in visits to family	0.399	0.385	0.226
wife no say in purchases for daily needs	0.395	0.379	0.263
wife no say in spending husband's earnings	0.317	0.299	0.142
can go to market alone	0.528	0.541	
can go to health facility alone	0.502	0.509	
can leave village alone	0.393	0.391	
has access to a bank account	0.153	0.160	
age at marriage	17.16	17.13	22.64
years of education	4.31	4.41	6.28
children	2.85	2.86	
height (cm)	151.83	151.81	
weight for height (relative to ref median of 100)[b]	84.41	84.58	
work in last seven days	0.360	0.397	0.969
conditional on working...			
work for self[c]	0.147	0.134	
work for family member	0.458	0.443	
work for another person	0.394	0.422	
work unpaid	0.230	0.223	
work for cash	0.671	0.695	0.915
work for in kind payment	0.225	0.194	0.232
work all year	0.658	0.682	0.284
work occasionally	0.341	0.316	
work away from home	0.792	0.807	
work in management/technical/professional	0.059	0.058	0.064
work in clerical/sales/service	0.127	0.127	0.215
work in manual (skilled or unskilled)	0.208	0.202	0.336
work in agriculture	0.603	0.611	0.378

Means are calculated using sampling weights

(a) The mens' results on the wife's decision-making refer to their reports of who makes the decisions in the household.

(b) The reference median is the World Health Organization's definition of a healthy population

(c) These questions are asked about work the woman does, not necessarily only in the last 7 days, so some women answer them even if they answered "no" to working in the last 7 days.

Table A1: Summary Statistics

	Work in…			
DEPENDENT VARIABLE	professional / managerial / technical	clerical / sales / service	manual	agriculture
Hindu X single	0.013**	-0.003	-0.043***	-0.054***
	[0.005]	[0.008]	[0.011]	[0.011]
Hindu	0.038	0.045	0.181***	0.143
	[0.065]	[0.059]	[0.069]	[0.197]
single	0.037***	0.063***	0.102***	-0.008
	[0.005]	[0.007]	[0.010]	[0.009]
Mean Dep Var	0.041	0.073	0.095	0.193
Observations	124,385	124,385	124,385	124,385
R-squared	0.032	0.036	0.044	0.097

*The regression includes fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. Sampling weights included. Standard error in brackets : *** p<0.01, ** p<0.05, * p<0.1.*

Table A2: Effects of the Hindu Succession Act on Single Women's Sector of Work

DEPENDENT VARIABLE		Work for…			Work regularity		Pay scheme: work for…			
	Work	self	family	another	occasional	all year	no pay	cash	in kind	Work away from home
subject to HSA	0.077**	0.019	-0.002	0.055*	0.003	0.059*	0.021	0.060**	0.012	0.057
	[0.034]	[0.015]	[0.028]	[0.031]	[0.014]	[0.034]	[0.013]	[0.028]	[0.029]	[0.036]
marriage age	-0.004***	0.000	-0.004***	0.000	-0.002***	-0.001	-0.002***	-0.003***	-0.001**	-0.003***
	[0.001]	[0.000]	[0.001]	[0.001]	[0.000]	[0.001]	[0.000]	[0.001]	[0.001]	[0.001]
education	-0.018***	0.000	-0.013***	-0.010***	-0.007***	-0.012***	-0.011***	-0.008***	-0.016***	-0.023***
	[0.001]	[0.000]	[0.001]	[0.001]	[0.000]	[0.001]	[0.000]	[0.001]	[0.001]	[0.001]
height (mm)	-0.004	0.001	0.000	-0.010***	0.006**	-0.018***	0.000	0.001	-0.011***	-0.009**
	[0.004]	[0.002]	[0.003]	[0.003]	[0.003]	[0.004]	[0.003]	[0.004]	[0.003]	[0.004]
Mean Dep Var	0.360	0.062	0.200	0.166	0.103	0.275	0.106	0.251	0.177	0.343
Observations	84,088	84,231	84,231	84,231	84,231	84,231	84,231	84,231	84,231	84,231
R-squared	0.131	0.042	0.119	0.085	0.088	0.095	0.114	0.082	0.106	0.163

*All regressions have the indicator variable for whether the woman was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table A3: IV Estimates of the Effects of the Hindu Succession Act on Women's Labor Supply, with Human Capital Controls

DEPENDENT VARIABLES (listed below)	When came to current place… Never moved (n = 19,556)	Before marriage (n = 12,112)	At time of marriage (n = 20,942)	After marriage (n = 32,852)
work	-0.011	0.034	-0.016	0.143***
	[0.073]	[0.098]	[0.093]	[0.053]
work for self	0.024	0.086**	0.042	-0.004
	[0.036]	[0.041]	[0.040]	[0.028]
work for family member	-0.079	-0.111	-0.068	0.047
	[0.059]	[0.087]	[0.060]	[0.041]
work for another	0.070	0.065	0.010	0.076*
	[0.054]	[0.074]	[0.081]	[0.042]
work unpaid	-0.029	-0.080	-0.050	0.021
	[0.034]	[0.063]	[0.043]	[0.025]
work for cash	0.027	0.143	0.016	0.101**
	[0.074]	[0.095]	[0.091]	[0.046]
work for in kind	0.061**	-0.001	-0.024	0.010
	[0.033]	[0.054]	[0.032]	[0.022]
work all year	0.003	0.096	-0.033	0.101**
	[0.059]	[0.098]	[0.081]	[0.049]
work occasionally	0.012	-0.074	0.016	0.023
	[0.050]	[0.073]	[0.073]	[0.036]
work away from home	0.036	-0.032	-0.077	0.118
	[0.070]	[0.097]	[0.086]	[0.050]
work professional/management/tech	0.051*	0.089***	-0.023	0.064***
	[0.029]	[0.033]	[0.033]	[0.019]
work in clerical/sales/service	0.050	0.024	-0.034	0.018
	[0.039]	[0.044]	[0.035]	[0.028]
work in manual labor	0.031	0.005	0.098	0.027
	[0.040]	[0.067]	[0.052]	[0.033]
work in agriculture	-0.116**	-0.077	-0.050	0.014
	[0.064]	[0.093]	[0.068]	[0.042]

*Each coefficient is from an IV regression (equation 2) estimated only on the subsample of currently married women who migrated at that time. Moving at time of marriage is defined as moving in the same calendar year as the marriage took place. All regressions have treatment instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 21 for details). *** p<0.01, ** p<0.05, * p<0.1.*

Table A4: Effects of the Hindu Succession Act by Time of Migration

DEPENDENT VARIABLE	Work		Work for another person		Work for cash		Work all year	
Estimation	OLS	IV	OLS	IV	OLS	IV	OLS	IV
pregnant	-0.0506***	-0.0542***	-0.0157*	-0.0177**	-0.0460***	-0.0486***	-0.0323***	-0.0341***
	[0.012]	[0.012]	[0.009]	[0.009]	[0.011]	[0.011]	[0.010]	[0.011]
children	-0.0068***	0.0154***	-0.0049***	0.0079***	-0.0110***	0.0056***	-0.0067***	0.0052***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
contracept	0.0262***	-0.0006	0.0194***	0.0039	0.0177***	-0.0025	0.0196***	0.0051
	[0.006]	[0.006]	[0.005]	[0.005]	[0.006]	[0.006]	[0.006]	[0.006]
mild anemia	-0.0004	0.0067	-0.0039	0.0002	0.0003	0.0056	-0.0047	-0.0009
	[0.005]	[0.006]	[0.004]	[0.004]	[0.005]	[0.005]	[0.005]	[0.005]
mod. anemia	-0.0019	-0.002	-0.0059	-0.0059	-0.0077	-0.0077	-0.0134**	-0.0134*
	[0.008]	[0.008]	[0.006]	[0.006]	[0.008]	[0.008]	[0.007]	[0.007]
severe anemia	-0.0117	-0.0015	0.014	0.02	0.0356*	0.0434**	-0.0004	0.0053
	[0.020]	[0.021]	[0.017]	[0.017]	[0.020]	[0.020]	[0.019]	[0.019]
weight/height	-0.0017***	-0.0045***	-0.0009***	-0.0026***	-0.0011***	-0.0032***	-0.0012***	-0.0027***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
moderate DV	0.0302***	0.0573***	0.0317***	0.0475***	0.0349***	0.0553***	0.0108*	0.0254***
	[0.007]	[0.007]	[0.006]	[0.006]	[0.006]	[0.006]	[0.007]	[0.007]
severe DV	0.0593***	0.0729***	0.0428***	0.0507***	0.0726***	0.0828***	0.0589***	0.0662***
	[0.010]	[0.010]	[0.008]	[0.008]	[0.009]	[0.009]	[0.010]	[0.010]
wealth[(a)]	-0.1340***		-0.0778***		-0.1009***		-0.0722***	
	[0.004]		[0.004]		[0.004]		[0.004]	
subject to HSA		0.1158***		0.0588		0.0705*		0.0876**
		[0.042]		[0.036]		[0.045]		[0.039]
Mean Dep Var	0.360	0.360	0.166	0.166	0.275	0.275	0.250	0.250
Observations	59,657	59,654	59,762	59,759	59,762	59,759	59,762	59,759
R-squared	0.163	0.141	0.109	0.097	0.118	0.104	0.098	0.089

(a) Wealth is constructed by taking the sum of household assets, using weights generated by principal components analysis. It is standardized to have standard deviation = 1.

*Columns 1, 3, 5, 7 are OLS estimations, while 2, 4, 6, and 8 are IV regressions where the indicator for subject to HSA is instrumented by fixed effects for Hindu X year of birth X state. Both IV and OLS regressions include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Standard errors in brackets. The standard error on the coefficient on subject to HSA bootstrapped; see footnote 21 for details. *** p<0.01, ** p<0.05, * p<0.1.*

Table A5: Labor supply, mother's health, and effects of the HSA

DEP VARIABLE:			Work for another					
Whether mother…	Work		person		Work for cash		Work all year	
Estimation	OLS	IV	OLS	IV	OLS	IV	OLS	IV
child's height	-0.0017**	-0.0039***	-0.0024***	-0.0036***	-0.0028***	-0.0044***	-0.0010*	-0.0022***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
child's weight/height	-0.0009**	-0.0015***	-0.0012***	-0.0016***	-0.0011***	-0.0015***	-0.0009**	-0.0012***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
child anemia_mild	0.001	-0.0028	0.0017	-0.0003	-0.0065	-0.0092	-0.0205	-0.0223
	[0.024]	[0.024]	[0.018]	[0.018]	[0.020]	[0.020]	[0.020]	[0.020]
child anemia_mod	0.0048	0.0053	0.0136**	0.0139**	0.0076	0.0081	0.0031	0.0035
	[0.009]	[0.009]	[0.007]	[0.007]	[0.008]	[0.008]	[0.007]	[0.007]
child anemia_sev	-0.0227**	-0.0108	-0.0127*	-0.0063	-0.0226***	-0.0141*	-0.0277***	-0.0218***
	[0.009]	[0.009]	[0.007]	[0.007]	[0.008]	[0.008]	[0.008]	[0.008]
contracept	0.0241**	-0.0027	0.0270***	0.0126*	0.0215**	0.0024	0.0228***	0.0092
	[0.010]	[0.010]	[0.008]	[0.008]	[0.009]	[0.009]	[0.009]	[0.009]
pregnant	-0.0327**	-0.0340**	-0.0088	-0.0094	-0.0332**	-0.0341**	-0.0220*	-0.0227*
	[0.015]	[0.015]	[0.010]	[0.010]	[0.013]	[0.013]	[0.013]	[0.013]
children	0.0009	0.0223***	0.0035	0.0151***	0.0005	0.0159***	0.0014	0.0121***
	[0.004]	[0.004]	[0.003]	[0.003]	[0.004]	[0.004]	[0.003]	[0.003]
mom anemia_mild	0.0032	0.0064	-0.0114	-0.0097	0.0045	0.0069	-0.0013	0.0004
	[0.009]	[0.010]	[0.007]	[0.007]	[0.009]	[0.009]	[0.008]	[0.008]
mom anemia_mod	-0.0044	-0.0043	-0.0081	-0.008	-0.0138	-0.0136	-0.0039	-0.0035
	[0.012]	[0.012]	[0.009]	[0.009]	[0.011]	[0.011]	[0.011]	[0.011]
mom anemia_sev	0.0017	0.0051	0.0199	0.0219	0.0408	0.0433	0.0559*	0.0569*
	[0.036]	[0.037]	[0.025]	[0.026]	[0.032]	[0.033]	[0.033]	[0.033]
mom weight/height	-0.0007**	-0.0027***	-0.0002	-0.0013***	-0.0005	-0.0019***	-0.0004	-0.0014***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
moderate DV	0.0269**	0.0471***	0.0267***	0.0377***	0.0266***	0.0412***	0.0133	0.0237**
	[0.011]	[0.011]	[0.008]	[0.008]	[0.010]	[0.010]	[0.010]	[0.010]
severe DV	0.0259*	0.0326**	0.0155	0.0191	0.0360**	0.0408***	0.0186	0.0220
	[0.016]	[0.016]	[0.012]	[0.012]	[0.014]	[0.014]	[0.014]	[0.014]
wealth[(a)]	-0.1240***		-0.0669***		-0.0887***		-0.0625***	
	[0.006]		[0.005]		[0.006]		[0.006]	
subject to HSA		0.1629		0.0917		0.1441		0.2259**
		[0.123]		[0.089]		[0.123]		[0.102]
Mean Dep Var	0.360	0.360	0.166	0.166	0.275	0.275	0.250	0.250
Observations	26,703	26,703	26,755	26,755	26,755	26,755	26,755	26,755
R-squared	0.152	0.12	0.117	0.101	0.126	0.107	0.104	0.094

Table A6: Labor supply, mother's and children's health, and effects of the HSA

(a) Wealth is constructed by taking the sum of household assets, using weights generated by principal components analysis. It is standardized to have standard deviation = 1.
Columns 1, 3, 5, 7 are OLS estimations, while 2, 4, 6, and 8 are IV regressions where the indicator for subject to HSA is instrumented by fixed effects for Hindu X year of birth X state. Both IV and OLS regressions include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. All regressions include sampling weights. Standard errors in brackets. IV coefficient on subject to HSA bootstrapped; see footnote 21 for details.
**** p<0.01, ** p<0.05, * p<0.1.*

A Appendix: Proofs

Proof of Lemma 2.1: Without loss of generality, in the proofs of the non cooperative model, we normalize γ_f and γ_m to 1.

Consider FOC of y_m in the husband's utility. Since we assume it is interior, the FOC equals 0.

$$\frac{-\beta_m}{w_m e_m + R_m + (1-a_f)(w_f e_f + R_f) - y_m} + \frac{1}{y_m + y_f} = 0$$

$$y_m = \frac{1}{\beta_m + 1}(w_m e_m + R_m + (1-a_f)(w_f e_f + R_f)) - \frac{\beta_m}{\beta_m + 1} y_f$$

$$u_m(e_m = 0) = \beta_m \ln(\beta_m) + (\beta_m + 1)\ln(\frac{R_m + (1-a_f)(w_f e_f + R_f) + y_f}{\beta_m + 1}) + \delta_m \ln(1)$$

$$u_m(e_m = E_m) = \beta_m \ln(\beta_m) + (\beta_m + 1)\ln(\frac{w_m E_m + R_m + (1-a_f)(w_f e_f + R_f) + y_f}{\beta_m + 1}) + \delta_m \ln(1 - E_m)$$

$$u_m(e_m = E_m) - u_m(e_m = 0) = (\beta_m + 1)\ln(\frac{w_m E_m + R_m + (1-a_f)(w_f e_f + R_f) + y_f}{R_m + (1-a_f)(w_f e_f + R_f) + y_f}) + \delta_m \ln(1 - E_m)$$

Define $f(E_m)$ as $f(E_m) = u_m(e_m = E_m) - u_m(e_m = 0)$, then $f(0) = 0$. In order to show $f(E_m) > 0$ for all $E_m \in (0, 1)$, we need $f'(E_m) > 0$.

$$f'(E_m) = \frac{w_m(\beta_m + 1)}{w_m E_m + R_m + (1-a_f)(w_f e_f + R_f) + y_f} - \frac{\delta_m}{1 - E_m}$$

$$\frac{\beta_m + 1}{\delta_m} > \frac{w_m E_m + R_m + (1-a_f)(w_f e_f + R_f) + y_f}{w_m(1 - E_m)}$$

Since $y_f \leq a_f(w_f e_f + R_f)$ and $e_f \leq E_f$, a sufficient condition is

$$\frac{\beta_m + 1}{\delta_m} > \frac{w_m E_m + R_m + w_f E_f + R_f}{w_m(1 - E_m)}$$

Proof of Proposition 2.2: In the equilibrium, FOCs for (y_f, y_m) (γ_f and γ_m are normalized to 1):

$$\frac{-\beta_f}{a_f(w_f e_f + R_f) - y_f} + \frac{1}{y_m + y_f} \leq 0$$

$$\frac{-\beta_m}{w_m e_m + R_m + (1-a_f)(w_f e_f + R_f) - y_m} + \frac{1}{y_m + y_f} \leq 0$$

$$z = \frac{w_m e_m + w_f e_f + R_m + R_f}{\beta_f + \beta_m + 1}$$

First, check if $e_f = 0$ is an equilibrium. Assume it is true, then in the equilibrium

$$y_m = \frac{\beta_f + 1}{\beta_f + \beta_m + 1}(w_m e_m + R_m + R_f) - a_f R_f$$

$$y_f = a_f R_f - \frac{\beta_f}{\beta_f + \beta_m + 1}(w_m e_m + R_m + R_f) + \frac{1}{\beta_f + 1} a_f w_f e_f$$

$$u_f(e_f = 0) = \beta_f \ln(\frac{\beta_f}{\beta_f + \beta_m + 1}(w_m e_m + R_m + R_f)) + \ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1})$$

Alternative, the wife may deviate and go out to work,

$$u_f(e_f = E_f) = \beta_f \ln(\frac{\beta_f}{\beta_f + 1} a_f w_f E_f + \frac{\beta_f}{\beta_f + \beta_m + 1}(w_m e_m + R_m + R_f))$$

$$+ \ln(\frac{1}{\beta_f + 1} a_f w_f E_f + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) + \delta_f \ln(1 - E_f)$$

To make sure no deviation, we need

$$u_f(e_f = 0) \geq u_f(e_f = E_f)$$

$$\ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) \geq \ln(\frac{a_f w_f E_f}{\beta_f + 1} + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1} \ln(1 - E_f)$$

Case 1a: $R_f + R_m$ **is constant.** There exists a threshold $t_1^a(w_f)$ decreasing in w_f, such that $e_f = 0$ is an equilibrium iff $a_f \leq t_1^a(w_f)$.

Second, check if $e_f = E_f$ is an equilibrium.

$$y_m = \frac{\beta_f + 1}{\beta_f + \beta_m + 1}(w_m e_m + w_f E_f + R_m + R_f) - a_f(R_f + w_f E_f)$$

$$y_f = a_f R_f - \frac{\beta_f}{\beta_f + \beta_m + 1}(w_m e_m + w_f E_f + R_m + R_f) + \frac{1}{\beta_f + 1} a_f w_f (e_f + \beta_f E_f)$$

$$u_f(e_f = E_f) = \beta_f \ln(\beta_f \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) + \ln(\frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) + \delta_f \ln(1 - E_f)$$

Alternative, the wife may deviate and not go to work,

$$u_f(e_f = 0) = \beta_f \ln(\frac{-\beta_f a_f w_f E_f}{\beta_f + 1} + \beta_f \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$
$$+ \ln(\frac{-a_f w_f E_f}{\beta_f + 1} + \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$

To make sure no deviation, we need

$$u_f(e_f = E_f) \geq u_f(e_f = 0)$$

$$\ln(\frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1} \ln(1 - E_f) \geq \ln(\frac{-a_f w_f E_f}{\beta_f + 1} + \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$

Case 1b: $R_f + R_m$ **is constant.** There exist a threshold $t_2^a(w_f)$ decreasing in w_f, such that $e_f = E_f$ is an equilibrium iff $a_f \geq t_2^a(w_f)$.

Proof of Proposition 2.4: The equilibrium is calculated in the proof of Proposition 2.2.

$$\ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) \geq \ln(\frac{w_f E_f}{\beta_f + 1} \frac{\alpha_f R_f}{R_f + R_m} + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1} \ln(1 - E_f)$$

Let $f(R_f)$ be

$$f(R_f) = \ln(\frac{w_f E_f}{\beta_f + 1} \frac{\alpha_f R_f}{R_f + R_m} + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) - \ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1})$$

where $f(0) = 0$ and $f(R_f) \to 0$ as $R_f \to \infty$. The condition can be rewritten as $f(R_f) \leq C$, where $C = -\frac{\delta_f}{\beta_f + 1} \ln(1 - E_f)$ is positive.

$$f'(R_f) \propto (R_m(R_m + w_m E_m) - R_f^2)$$

So $f(R_f)$ first increases and then decreases.

Case 2a: R_m **is constant.** There exist a threshold t_1^w, such that $e_f = 0$ is an equilibrium if $w_f < t_1^w$. Otherwise, there are two thresholds $t_{1L}^R(w_f) < t_{1H}^R(w_f)$, the former decreasing

in w_f and the latter increasing in w_f, such that $e_f = 0$ is an equilibrium if $R_f < t^R_{1L}(w_f)$ or $R_f > t^R_{1H}(w_f)$.

$$\ln(\frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1}\ln(1 - E_f) \geq \ln(\frac{-w_f E_f}{\beta_f + 1}\frac{\alpha_f R_f}{R_f + R_m} + \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$

Let $g(R_f)$ be

$$g(R_f) = \ln(\frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) - \ln(\frac{-w_f E_f}{\beta_f + 1}\frac{\alpha_f R_f}{R_f + R_m} + \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$

where $g(0) = 0$ and $g(R_f) \to 0$ as $R_f \to \infty$.. The condition can be rewritten as $g(R_f) \geq C$.

$$g'(R_f) \propto (R_m(R_m + w_m E_m + w_f E_f) - R_f^2)$$

So $g(R_f)$ first increases and then decreases.

Case 2b: R_m is constant. There exist a threshold t^w_2, such that $e_f = E_f$ is never an equilibrium if $w_f < t^w_2$. Otherwise, there are two thresholds $t^R_{2L}(w_f) < t^R_{2H}(w_f)$, the former decreasing in w_f and the latter increasing in w_f, such that $e_f = E_f$ is an equilibrium if $R_f \in (t^R_{2L}(w_f), t^R_{2H}(w_f))$.

Proof of Proposition 2.6:
Consider the FOC with respect to (x_f, x_m):

$$\frac{a_f \beta_f}{x_f} - \frac{(a_f\gamma_f + (1-a_f)\gamma_m)p_f}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} \leq 0$$

$$\frac{(1-a_f)\beta_m}{x_m} - \frac{(a_f\gamma_f + (1-a_f)\gamma_m)p_m}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} \leq 0$$

$$p_f x_f = \frac{a_f \beta_f z}{a_f\gamma_f + (1-a_f)\gamma_m}$$

$$p_m x_m = \frac{(1-a_f)\beta_m z}{a_f\gamma_f + (1-a_f)\gamma_m}$$

$$z = \frac{a_f\gamma_f + (1-a_f)\gamma_m}{a_f(\beta_f + \gamma_f) + (1-a_f)(\beta_m + \gamma_m)}[w_m e_m + R_m + w_f e_f + R_f]$$

$$f(E_m) = u(e_m = E_m) - u(e_m = 0)$$

$$= (a_f(\beta_f + \gamma_f) + (1 - a_f)(\beta_m + \gamma_m)) \ln \frac{w_m E_m + R_m + w_f e_f + R_f}{R_m + w_f e_f + R_f} + (1 - a_f)\delta_m \ln(1 - E_m)$$

$$f'(E_m) = \frac{w_m(a_f(\beta_f + \gamma_f) + (1 - a_f)(\beta_m + \gamma_m))}{w_m E_m + R_m + w_f e_f + R_f} - \frac{(1 - a_f)\delta_m}{1 - E_m}$$

(A2) ensures $f'(E_m)$ is positive, together with $f(0) = 0$, we have $f(E_m) > 0$, implying the husband always works.

Similarly,

$$g(E_f) = u(e_f = E_f) - u(e_f = 0) = \ln \frac{w_m E_m + R_m + w_f E_f + R_f}{R_m + w_m E_m + R_f} + a_f \delta_f \ln(1 - E_f)$$

Regardless of $R_m + R_f$ or R_m is constant, an increase in R_f decreases $g(E_f)$. The threshold of the change from working to not working, $t(w_f)$, is an increasing function of her wage w_f.

$$z = (a_f(\gamma_f - \gamma_m) + \gamma_m)[w_m e_m + R_m + w_f e_f + R_f]$$

Thus, an increase in R_f increases z if $\gamma_f \geq \gamma_m$ unless the decrease in e_f is sufficiently high. (Note that the normalization $\beta_f + \gamma_f = \beta_m + \gamma_m = 1$ helps to simplify the proof here. Without it, the prediction is less tractable, but we believe the intuition, that women work less when getting more autonomy in collective households, remains.)

B Appendix: Extensions

B.1 Extension: Continuous Effort

Proposition B.1. *Suppose the Nash equilibrium is fully interior. In equilibrium, keeping the total unearned income constant, an increase in the wife's unearned income:*

- *Increases the amount of time she works outside the home (e_f).*
- *Increases the supply of the household public good (z).*
- *Reduces the amount of time the husband works outside the home (e_m).*

Proof of Proposition B.1: Calculating the FOC on (e_f, y_f, e_m, y_m) as follows:

$$\frac{\beta_f w_f a_f}{a_f(w_f e_f + R_f) - y_f} - \frac{\delta_f}{1 - e_f} \leq 0$$

$$\frac{-\beta_f}{a_f(w_f e_f + R_f) - y_f} + \frac{\gamma_f}{y_m + y_f} \leq 0$$

$$\frac{w_m \beta_m}{w_m e_m + R_m + (1 - a_f)(w_f e_f + R_f) - y_m} - \frac{\delta_m}{1 - e_m} \leq 0$$

$$\frac{-\beta_m}{w_m e_m + R_m + (1 - a_f)(w_f e_f + R_f) - y_m} + \frac{\gamma_m}{y_m + y_f} \leq 0$$

Suppose the Nash equilibrium is fully interior, so we have four equations. Since $z = y_f + y_m$, we have $e_m = 1 - \frac{\delta_m z}{\gamma_m w_m}$ and $e_f = 1 - \frac{\delta_f z}{\gamma_f w_f \alpha_f R_f / (R_f + R_m)}$. Thus,

$$z = \frac{\gamma_f \gamma_m (w_m + R_m + w_f + R_f)}{\gamma_f + \gamma_m (\beta_f + \delta_f \frac{1}{\alpha_f R_f / (R_f + R_m)})}$$

As $R_f + R_m$ is constant and R_f increases, z increases.

$$e_m = 1 - \frac{\delta_m z}{\gamma_m w_m} = 1 - (1 + \frac{w_f + R_f + R_m}{w_m}) \frac{\delta_m \gamma_f}{\gamma_f + \gamma_m \beta_f + \delta_f \gamma_m / a_f}$$

As $R_f + R_m$ is constant and R_f increases, z increases, and thus e_m decreases.

$$e_f = 1 - \frac{\delta_f}{\gamma_f w_f \alpha_f R_f / (R_f + R_m)} z$$

$$= 1 - \frac{\delta_f \gamma_m (w_m + R_m + w_f + R_f)(R_m + R_f)}{w_f ((\gamma_f \alpha_f + \gamma_m \beta_f \alpha_f) R_f + \gamma_m \delta_f (R_f + R_m))}$$

As $R_f + R_m$ is constant and R_f increases, e_f increases.

Proposition B.2. *Suppose the Nash equilibrium is fully interior. In equilibrium, there exist two thresholds, $\alpha^*(w_f)$ strictly decreasing in w_f and $R_f^*(w_f)$ strictly increasing in w_f.*[33] *Consider a pure increase in the wife's unearned income:*

- *If $\alpha_f > \alpha^*(w_f)$ and $R_f < R_f^*(w_f)$, it increases the amount of time she works outside the home (e_f).*
- *Otherwise, it reduces the amount of time she works outside the home (e_f).*

[33] In fact, both α^* and R_f^* depend on all sorts of things, including w_m, w_f, R_m and etc. We highlight their relationships with w_f in order to study the labor supply for jobs with different wages.

- *In both cases, it increases the supply of the household public good (z) and reduces the amount of time the husband works outside the home (e_m).*

Proof of Proposition B.2: The equilibrium is calculated in the proof of Proposition B.1.

$$z = \frac{\gamma_f \gamma_m (w_m + R_m + w_f + R_f)}{\gamma_f + \gamma_m (\beta_f + \delta_f \frac{1}{\alpha_f R_f / (R_f + R_m)})}$$

As R_f increases, $R_f/(R_f + R_m)$ increases, and thus z increases

$$e_m = 1 - \frac{\delta_m z}{\gamma_m w_m}$$

As R_f increases, z increases, and thus e_m decreases.

$$\begin{aligned} e_f &= 1 - \frac{\delta_f}{\gamma_f w_f \alpha_f R_f/(R_f + R_m)} z \\ &= 1 - \frac{\delta_f \gamma_m (w_m + R_m + w_f + R_f)(R_m + R_f)}{w_f((\gamma_f \alpha_f + \gamma_m \beta_f \alpha_f + \gamma_m \delta_f) R_f + \gamma_m \delta_f R_m)} \end{aligned}$$

Take FOC, $\partial(1 - e_f)/\partial R_f$, the FOC has the same sign as

$$[(\gamma_f \alpha_f + \gamma_m \beta_f \alpha_f + \gamma_m \delta_f) R_f^2 + 2\gamma_m \delta_f R_m R_f + (\delta_f \gamma_m R_m - \alpha_f (\gamma_f + \beta_f \gamma_m)(w_m + w_f + R_m)) R_m]/w_f$$

If $\alpha_f \leq \frac{\delta_f \gamma_m R_m}{(\gamma_f + \beta_f \gamma_m)(w_m + w_f + R_m)} = \alpha^*(w_f)$, the FOC is always positive. So an increase in R_f leads to a decrease in e_f.

Otherwise,

$$R_f^* = \frac{\sqrt{(\gamma_m \delta_f R_m)^2 - (\gamma_f \alpha_f + \gamma_m \beta_f \alpha_f + \gamma_m \delta_f)[\delta_f \gamma_m R_m - \alpha_f (\gamma_f + \beta_f \gamma_m)(w_m + w_f + R_m)] R_m} - \gamma_m \delta_f R}{\gamma_f \alpha_f + \gamma_m \beta_f \alpha_f + \gamma_m \delta_f}$$

if $R_f < R_f^*(w_f)$, an increase in R_f leads to an increase in e_f; if $R_f > R_f^*(w_f)$, an increase in R_f leads to a decrease in e_f.

Proposition B.3. *In this collective model, suppose the Nash equilibrium is fully interior. In equilibrium, as R_f increases, e_f decreases regardless of whether R_m is constant or $R_f + R_m$ is constant. If $\gamma_f \geq \gamma_m$, as R_f increases, z increases. If $R_f + R_m$ is constant, as R_f increases, e_m increases.*

Proof of Proposition B.3: Consider the FOC with respect to (x_f, x_m, e_f, e_m):

$$\frac{a_f\beta_f}{x_f} - \frac{(a_f\gamma_f + (1-a_f)\gamma_m)p_f}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} \leq 0$$

$$\frac{(1-a_f)\beta_m}{x_m} - \frac{(a_f\gamma_f + (1-a_f)\gamma_m)p_m}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} \leq 0$$

$$\frac{(a_f\gamma_f + (1-a_f)\gamma_m)w_f}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} - \frac{a_f\delta_f}{1-e_f} \leq 0$$

$$\frac{(a_f\gamma_f + (1-a_f)\gamma_m)w_m}{w_m e_m + R_m + w_f e_f + R_f - x_f p_x - x_m p_m} - \frac{(1-a_f)\delta_m}{1-e_m} \leq 0$$

Suppose the Nash equilibrium is fully interior, so we have four equations. And we can solve the equilibrium:

$$z = (\gamma_m + (\gamma_f - \gamma_m)\alpha_f \frac{R_f}{R_f + R_m})(R_m + R_f + w_m + w_f)$$

$$e_f = 1 - \frac{\alpha_f R_f \delta_f (R_m + R_f + w_m + w_f)}{(R_f + R_m)w_f}$$

$$e_m = 1 - (1 - \alpha_f \frac{R_f}{R_f + R_m})\delta_m (R_m + R_f + w_m + w_f)/w_m$$

As R_f increases, e_f decreases regardless of whether R_m is constant or $R_f + R_m$ is constant. Furthermore, if $\gamma_f \geq \gamma_m$, as R_f increases, z increases.

B.2 Extension: Contributing time to household public good

Consider an extension where the wife also contributes time to produce the household public good. Thus the household public good depends on both the husband and the wife's money investment and the wife's effort.

$$z = f(y_m, y_f, h_f) = y_m + y_f + bh_f$$

where the wife spends a unit time on working at home h_f, working outside e_f and her leisure l_f, say $h_f + e_f + l_f = 1$.

Proposition B.4. *Suppose the Nash equilibrium is interior and the husband always works. In equilibrium, an increase in the wife's unearned income:*

- *Either increase her labor supply or keep it constant (e_f).*

- *Increase the household public good (z) if e_f increases.*

Proof of Proposition B.4: Consider the FOC on (y_m, y_f, h_f):

$$\frac{-\beta_f}{a_f(w_f e_f + R_f) - y_f} + \frac{1}{y_m + y_f + bh_f} = 0$$

$$\frac{-\beta_m}{w_m E_m + R_m + (1 - a_f)(w_f e_f + R_f) - y_m} + \frac{1}{y_m + y_f + bh_f} = 0$$

$$\frac{b}{y_m + y_f + bh_f} - \frac{\delta_f}{1 - h_f - e_f} = 0$$

$$z = \frac{w_m E_m + R_m + w_f e_f + R_f + b(1 - e_f)}{\beta_f + \beta_m + \delta_f + 1}$$

Suppose $e_f = 0$ is the equilibrium,

$$u_f(e_f = 0) - u_f(e_f = E_f)$$

$$= (\beta_f + \delta_f + 1)[\ln \frac{w_m E_m + R_m + R_f + b}{\beta_f + \beta_m + \delta_f + 1} - \ln(\frac{(a_f w_f - b)E_f}{\beta_f + \delta_f + 1} + \frac{w_m E_m + R_m + R_f + b}{\beta_f + \beta_m + \delta_f + 1}]$$

So we need $b \geq a_f w_f$.

Next, suppose $e_f = E_f$ is the equilibrium,

$$u_f(e_f = E_f) - u_f(e_f = 0) = (\beta_f + \delta_f + 1)[\ln \frac{w_m E_m + w_f E_f + R_m + R_f + b(1 - E_f)}{\beta_f + \beta_m + \delta_f + 1}$$

$$- \ln(\frac{(b - a_f w_f)E_f}{\beta_f + \delta_f + 1} + \frac{w_m E_m + w_f E_f + R_m + R_f + b(1 - E_f)}{\beta_f + \beta_m + \delta_f + 1}]$$

So we need $b \leq a_f w_f$.

B.3 Extension: Autonomy depends on potential wage

Consider another extension: her potential wage also affects the wife's autonomy:

$$a_f = \alpha_f \frac{R_f + \theta w_f}{R_f + R_m + \theta w_f + \theta w_m}$$

The equation is based on the intuition that the wife's outside option depends on her unearned income and her potential wage, which would determine her income if she leaves

the household, but not her current earned income. We assume there is a discount $\theta < 1$ on her potential wage compared to unearned income, since earning income costs effort.

Proposition B.5. *Making autonomy dependent on a woman's potential wage does not change the predictions in Proposition 2.2, Proposition 2.4 (if w_f is lower than a threshold) and Proposition 2.6.*

Proof of Proposition B.5: In a non-cooperative model, we need:

$$\ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) \geq \ln(\frac{a_f w_f E_f}{\beta_f + 1} + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1} \ln(1 - E_f)$$

to ensure $e_f = 0$ is an equilibrium. And we need

$$\ln(\frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1}) + \frac{\delta_f}{\beta_f + 1} \ln(1 - E_f) \geq \ln(\frac{-a_f w_f E_f}{\beta_f + 1} + \frac{w_m e_m + w_f E_f + R_m + R_f}{\beta_f + \beta_m + 1})$$

to ensure $e_f = E_f$ is an equilibrium.

If $R_m + R_f$ is constant, the thresholds on autonomy remain the same. And as w_f is higher, the thresholds get smaller and the autonomy gets higher, so the wife is more likely to start working.

If R_m is constant, same as the proof of Proposition 2.4, let $f(R_f)$ be

$$f(R_f) = \ln(\frac{w_f E_f}{\beta_f + 1} \frac{\alpha_f (R_f + \theta w_f)}{R_f + R_m + \theta w_f + \theta w_m} + \frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1}) - \ln(\frac{w_m e_m + R_m + R_f}{\beta_f + \beta_m + 1})$$

$$f'(R_f) \propto ((R_m + \theta w_m)(R_m + w_m E_m) - \theta w_f (R_m + \theta w_f + \theta w_m) - R_f^2)$$

When w_f is sufficiently small, we still have $f(0) < C$, $f(\infty) = 0$ and $f(R_f)$ first increases and then decreases. The same is also true for the function $g(R_f)$ defined in the proof of Proposition 2.4.

In a collective household, we have:

$$u(e_f = E_f) - u(e_f = 0) = \ln \frac{w_m E_m + R_m + w_f E_f + R_f}{R_m + w_m E_m + R_f} + a_f \delta_f \ln(1 - E_f)$$

Regardless of $R_m + R_f$ or R_m is constant, an increase in R_f decreases $u(e_f = E_f) - u(e_f = 0)$.

$$z = (a_f(\gamma_f - \gamma_m) + \gamma_m)[w_m e_m + R_m + w_f e_f + R_f]$$

Thus, an increase in R_f increases z if $\gamma_f \geq \gamma_m$ unless the decrease in e_f is sufficiently high.

B.4 Alternative Model: Husband has the final say

In India, husbands may not only control their wives' income, but also make the final decision whether their wives can work outside the home or not. In many traditional and conservative societies, the husband may consider his "pride" hurt if his wife goes out to work or forbid her from working to keep her bargaining power low (Basu, 2006). For simplicity, we assume the husband loses utility if his wife works outside the home:

$$u_m(x_m, z, l_m, e_f) = \beta_m lnx_m + \gamma_m lnz + \delta_m lnl_m - \theta_m ln(e_f + 1)$$

since e_f could be 0, we use $e_f + 1$ to prevent an infinitely positive utility.

Consider the following sequential game:

1. First, the husband decides whether to allow his wife to work outside or not.
2. If the wife is allowed to work, the husband and wife choose their optimal strategies as in the main model. The wife's optimal labor supply is denoted as e_f^*. Otherwise, the wife can either not work or leave the husband. If the wife leaves her husband, they get separate utilities, $u_m^d(R_m, w_m)$ and $u_f^d(R_f, w_f)$, based on their own unearned incomes and their potential wages.

We focus on the case where the husband prefers his wife not to work and extremely dislikes being alone. Consider the utility u_m from the equilibrium,

$$u_m(e_f = 0) \geq u_m(e_f = e_f^*) \geq u_m^d(R_m, w_m)$$

where the husband's utility is the highest if they stay married and the wife doesn't work outside, otherwise staying married with the wife working is better than being separated.

Since it takes quite a few steps to solve this sequential game, we focus on explaining the intuition behind the possibility that an increase in R_f can increase the wife's labor supply. In the beginning, R_f is low and thus the wife's outside option $u_f^d(R_f, w_f)$ is low. If $u_f^d(R_f, w_f) < u_f(e_f = 0)$, she doesn't prefer to be alone and the husband would forbid the wife from working. When R_f increases, $u_f^d(R_f, w_f)$ may increase at a higher speed than that of $u_f(e_f = 0)$, because the wife controls only a part of her income if she is in a household. When $u_f^d(R_f, w_f)$ exceeds $u_f(e_f = 0)$, the wife prefers to leave the husband. In order to keep the wife, the husband has to allow her to work.

Both the main model and this alternative model suggest that an increase in the wife's unearned income could increase her labor supply, through the channel of autonomy. The

only difference is that in the main model with an increase in her autonomy, the wife has a higher control over her income which gives her incentives to work more; in the alternative model, autonomy increases the wife's outside option and the husband has to allow her to work in order to keep her in the household.

B.5 Relaxing the assumption that men always work

If we relax assumption (A1), which postulates parameter values such that men always work, our model would predict that men's labor supply falls as his wife becomes eligible. Intuitively, both claims predict women (aggregately) work more as their unearned income increases, which gives men a positive income shock, and thus men would weakly decrease their labor supply.

To test this prediction, we consider a man i of religion r, born in year τ in state j to be treated if his wife is Hindu and they married after the HSA was enacted in their state. Since a man's choice of the age or religion of the woman he will marry may be affected by the HSA, we instrument his wife's exposure using his own religion[34] and year of birth, yielding a first stage of:

$$WifeEligible_{ijr\tau} = \delta_{jr\tau} + v_{ijr\tau} \tag{5}$$

Analogous to the women's results, in the second stage we assume that men's labor outcomes are the function of the predicted eligibility of his wife, as well as fixed effects for his religion, year of birth, state, religion $\times$ state, religion $\times$ year of birth, and state $\times$ year of birth.

$$y_{ijr\tau} = \widehat{WifeEligible}_{ijr\tau} + \theta_\tau + \nu_r + \psi_j + \gamma_{r\tau} + \lambda_{j\tau} + \mu_{jr} + \varepsilon_{ijr\tau} \tag{6}$$

The results of this equation show that the HSA lead to a 3.5 percentage point decrease in men's labor supply; this effect is borderline statistically significant ($P = 0.145$). There is thus suggestive evidence that men respond to women's increased labor supply (and corresponding contribution to the household good) by working less themselves. There is also some evidence that behind the negative overall effect is a sectoral shift away from manual labor and into professional and clerical/sales/service jobs. Men whose wives now work more will only choose jobs in desirable sectors.[35]

[34]Of course, inter-religious marriages are rare. Only 1.6 percent of men who were Hindu (or Buddhist, Jain, or Sikh) married women whose religions were not covered by the HSA, and 5.1 percent of men who were not Hindu married Hindu women. Still, to make sure these small percentage of marriages are not driving our results, we use men's religion rather than women's religion to predict his exposure to the Act.

[35]This prediction requires that for some men, a manual job would pay more than professional or clerical, since otherwise these men would have been doing the professional/clerical jobs already. The possibility of

DEPENDENT VARIABLE	Work	Pay scheme: work for…			Work in…			
		no pay	cash	in kind	professional / managerial / technical	clerical / sales / service	manual	agriculture
wife subject to HSA	-0.035	-0.013	0.013	0.038	0.041	0.066*	-0.076	-0.027
	[0.024]	[0.017]	[0.026]	[0.042]	[0.028]	[0.036]	[0.055]	[0.056]
Mean Dep Var	0.969	0.044	0.915	0.232	0.064	0.211	0.334	0.378
Observations	39,267	39,281	39,281	39,281	39,281	39,281	39,281	39,281
R-squared	0.059	0.148	0.124	0.105	0.073	0.073	0.067	0.041

All regressions have the indicator variable for whether the man's wfie was subject to the HSA instrumented by fixed effects for Hindu X year of birth X state and include a dummy for Hindu and fixed effects for year of birth, state, Hindu X year of birth, Hindu X state, and state X year of birth. The Hindu dummy also includes Sikhs, Buddhists, and Jains, as described in section 3. All regressions include sampling weights. Bootstrap standard errors in brackets (see footnote 16 for details).
**** p<0.01, ** p<0.05, * p<0.1.*

IV Estimates of the Effects of the Hindu Succession Act on Men's Labor Supply

compensating differentials for manual work make this theory plausible, for some men at least.