CSAE WPS/2002-22

Assets at Marriage in Rural Ethiopia

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July 2002

Abstract

This paper examines the determinants of assets at marriage in rural Ethiopia. We identify and test three separate processes that determine assets brought to marriage: assortative matching; compensating parental transfers at marriage; and strategic behavior by parents. We find ample evidence for the first, none for the second, and some evidence of the third for brides. We also find no evidence of competition for parental assets among siblings. Results suggests that parents do not transfer wealth to children in ways that compensate for marriage market outcomes. Certain parents, however, give more assets to daughters whenever doing so increases the chances of marrying a wealthy groom.

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1. Introduction

Economic analysis of marriage and the family has grown tremendously since Becker's (1981) Treatise on the Family. Phenomena such as family formation, intergenerational transfers, and the allocation of resources within the family, previously the domain of anthropology and sociology, have increasingly been subject to economic investigation (e.g. Boulier and Rosenzweig 1984, Bergstrom 1997, Weiss 1997, Becker and Tomes 1986, Behrman 1997, Haddad, Hoddinott and Alderman 1997). Marriage, in particular, is an institution of great interest, since, in many developing countries, it represents the union not only of two individuals, but also of two family or kinship groups (Rosenzweig and Stark 1989). Moreover, in many societies, marriage is the occasion for a substantial transfer of assets from the parent to the child generation. Lastly, recent work testing the collective versus the unitary model of household decision making has paid increased attention to conditions prevailing at the time of marriage. In particular, it has been shown that the distribution of assets between spouses at the time of marriage acts as possible determinant of bargaining power within marriage (e.g. Thomas, Contreras and Frankenberg 1997, Quisumbing and de la Brière 2000, Quisumbing and Maluccio 1999). While it can be argued that assets at marriage do not completely determine the distribution of assets upon divorce (Fafchamps and Quisumbing 2002), these measures are, in themselves, worth investigating because they shed light on the institution of marriage and inheritance.

In agrarian societies, marriage is an event of deep economic importance. First, it typically marks the onset not only of a new household but also of a new production unit, e.g., a family farm. Assets brought to marriage determine the start-up capital of this new enterprise. The success of the enterprise thus depends on what happens on the 'marriage market', that is, on the arrangement between the bride, the groom, and their respective families regarding the devolution of assets to the newly formed household. Farm formation cannot be dissociated from marriage market considerations. Second, in an environment where asset accumulation takes time and is particularly difficult for the poor, assets brought to marriage play a paramount role in shaping the lifetime prosperity of newly formed households: well married daughters can expect a life of relative comfort while poorly married daughters may spend most of their life in utter poverty. Assortative matching between spouses – the rich marry the rich, the poor marry the poor –

not only increases inequality, it also reduces social mobility due to intergenerational transfers of assets at marriage.

This paper examines the determinants of assets brought to marriage in rural Ethiopia. Two major processes shape what newlyweds bring to the newly formed family unit: the matching between spouses with different assets, and parents' decisions to endow their marrying children with start-up capital. This paper seeks to assess the relative importance of these two processes in arranged marriages such as those encountered in rural Ethiopia.

The importance of the matching process between potential brides and grooms was first brought to light by Becker (1981). In Becker's work, a match (i.e., set of marriages) is an equilibrium if no bride or groom can lure a partner away from a proposed union. Becker showed that this simple, intuitive requirement naturally leads to assortative matching whereby the rich marry the rich and the poor marry the poor. The reason is that rich brides can be lured away from poor grooms by rich grooms but the reverse is not true. Since Becker's initial contribution, assortative matching has been studied in settings other than the marriage market – e.g., hospitals and medical interns, sorority rush, etc. (e.g. Roth 1991, Mongell and Roth 1991, Roth and VandeVate 1990).

While marriage markets in developed – primarily urban – economies can adequately be described as a pure matching process, this is not true for arranged marriages in traditional rural societies. This is because marriage also marks the creation of a new farming unit. At marriage, parents decide not only about the choice of a bride but also about with how much start-up capital to endow the newlyweds. What they give nearly always constitute an advanced inheritance. When giving, parents must balance the interest of the marrying child against their old age needs and the inheritance of unmarried siblings. This means that, under fairly general assumptions, parents' incentive to give to their marrying child is a decreasing function of what is given by the spouse's parents: if the groom brings a lot, the bride does not need to bring as much, and the parents can keep more for themselves and their other children. The end result is a 'compensation effect': if the groom brings a lot, the bride brings less.

Assortative matching and compensating transfers from parents thus operate in opposite directions: while assortative matching generates a positive correlation between assets brought to marriage by both spouses, compensating transfers tend to generate a negative correlation. By itself assortative matching reinforces asset inequality in agrarian societies – or at the very least enables it to persist over time. In contrast, if there is no assortative matching, transfers from parents work to equalize assets brought to marriage: a groom from a rich family married to a poor bride would compensate by bringing more assets than a groom from a similarly wealthy family married to a rich bride. If the equalizing effect of transfers from parents were to dominate, the marriage market would have a strong redistributive effect.

Transfers from parents can, however, work in the same direction as assortative matching if parents act strategically, that is, if they internalize the effect of their transfers on the marriage prospects of their offspring. The intuition is that parents may give more to their daughter if she can attract a wealthier groom. If parents compete for attractive matches on behalf of their offspring, the marriage equilibrium again exhibits assortative matching: children of rich parents marry children of other rich parents. The difference with pure assortative matching à la Becker is that assets brought to marriage then depend on the 'slope' of marriage prospects: at the margin, parents give more if it enables their child to marry a much better prospect.

The purpose of this paper is to investigate these ideas formally. We investigate how rural society endows new couples with the assets they need to set up a farm and family – typically land and livestock, utensils, grains, and consumer durables such as clothing and jewelry. We find that intergenerational transfers take place primarily at the time of marriage. This is particularly true for men, to whom most productive assets are bequeathed, whether at marriage or afterwards. We also test whether parents act strategically. Results suggest that assets brought to marriage by brides follow a strategic motive. This does not hold for grooms.

This paper differs from previous work in several respects. First, we distinguish assortative matching from assets brought to marriage. Second, we separate factors that affect intergenerational transfers from those that reflect the relative scarcity of brides and grooms. Third, unlike other marriage market studies which focus on dowry and brideprice *per se*, that is, on transfers at marriage from one family to the other (e.g. Rao 1993, Foster 1996), we examine the totality of assets brought to marriage, whether these were acquired from parents or other sources prior to marriage or received at the time of marriage. This more inclusive measure is more appropriate in rural Ethiopia because gifts from the families to each other and to the couple account for a small proportion of assets brought to marriage. The main purpose of these gifts seems to be to seal the marriage and cover the cost of the wedding rather than to endow the new couple. This lesson should be kept in mind when conducting marriage market studies in other (African) countries.

Ethiopia is an ideal site for studying marriage customs, since it is characterized by extensive agro-ecological and ethnic diversity. Different religions, with widely divergent views regarding matrimonial issues and the status of women, are well represented and tend to dominate different parts of the country-the Orthodox church of Ethiopia in the north, Sunni Muslims in the east and west, recently converted Protestants in the South, and animist believers in parts of the south. The ethnic and cultural makeup of the country is also quite varied, with Semitic traditions in the north, Cushitic traditions in the south and east, and Nilotic traditions in the west. Climatic and ecological variation is equally high, given the mountainous terrain and the fact that the country stretches from the dry Sahel to the humid equatorial zone. Finally, local traditions have remained largely untouched given the lack of roads and the relative isolation of the countryside.

The paper is organized as follows. Section 2 presents the conceptual framework and testing strategy. A brief description of the survey and the survey area follows in Section 3. Section 3 examines the determinants of the value of assets brought to marriage by the bride and groom. We show that intergenerational transfer considerations affect the aggregate amount transferred to the new family unit. The distribution of assets at marriage between spouses is analyzed as a function of personal, parental, and marriage market characteristics. The last Section concludes.

2. Conceptual Framework

The starting point of our enquiry is a model of compensating transfers from parents to children at the time of marriage. This model resembles a standard bequest model, except that interpretation is slightly different since the transfer takes place inter vivos. Let the assets brought to marriage by the groom and bride be written μ and β, respectively. Without loss of generality, we focus on the groom's problem.

We begin by taking β as given and we focus on the choice of μ. Parents have initial wealth w^p while the child has initial personal wealth w^c. Parents decide how much of their wealth to transfer to their son.[1] Let the transfer be denoted τ. Parents are altruistic and care about their own utility $v(.)$ and that of their marrying child $u(.)$. Their combined utility is of the form $u(w^p - \tau) + \omega v(w^c + \tau + \beta)$ where $u(.)$ and $v(.)$ are concave increasing functions and ω is a welfare weight. For simplicity, we assume that $u(x) = v(x) = x^\rho$. Since $\mu = w^c + \tau$, it follows that $\tau = \mu - w^c$ and thus that:

$$w^p - \tau = w^p + w^c - \mu \tag{2.1}$$

Let the combined wealth of the groom and his parents be denoted $\overline{\mu} \equiv w^p + w^c$. We assume that the groom's parents and the bride's parents transfer a non-negative amount to their children.[2] This means that $\mu \geq 0$ and $\beta \geq 0$. In the context of rural Ethiopia, this is an appropriate assumption.[3] The optimization problem of the groom's parents can be written:

$$\max_{0 \leq \mu \leq \overline{\mu}} \frac{1}{\rho} [(\overline{\mu} - \mu)^\rho + \omega(\mu + \beta)^\rho] \tag{2.2}$$

The interior solution to this problem has a linear form:

$$\begin{aligned} \mu^* &= \frac{\omega^\sigma}{1 + \omega^\sigma}\overline{\mu} - \frac{1}{1 + \omega^\sigma}\beta && (2.3) \\ &\equiv a\overline{\mu} - b\beta \geq 0 && (2.4) \end{aligned}$$

where σ is the elasticity of substitution, i.e., $\frac{\sigma-1}{\sigma} \equiv \rho$. What parents give to their son is an increasing function of their combined wealth but a decreasing function of what the bride brings to the marriage β.

[1] It is also conceivable that parents require transfers from their children in order to authorize marriage – and access to lineage land (e.g. Lucas and Stark 1985, Stark and Lucas 1988). Our model applies to this case as well.

[2] This is equivalent to assuming that groom's parents cannot extort payment from the bride's parents simply to authorize them to marry. One way to justify this assumption is participation to the marriage market is voluntary. Brides and grooms can avoid extorsion by eloping.

[3] In our model, what parents give is used as start-up capital by the newly formed household. Even though there might be exceptions, dowry payments in other parts of the world such as India largely fall within this general category provided we include consumer durables.

The bride's parents solve a similar problem which yields the interior solution:

$$\beta^* = c\overline{\beta} - d\mu \geq 0 \tag{2.5}$$

where $\overline{\beta}$ is the combined wealth of the bride and her parents and β^* similarly decreases with assets brought by the groom. This is the substitution effect we discussed in the introduction. In the population we study, brides bring few assets to marriage. In the context of our model, this can be represented by a smaller welfare weight for brides. We therefore expect that $c < a$ and $d > b$.

We now examine the Nash equilibrium of the transfer game between parents. Equations 2.4 and 2.5 describe the behavior of the groom's and bride's parents when they both give and can easily be solved jointly. The resulting equilibrium configuration is as follows:

$$\begin{aligned}
\mu^* &= 0 \text{ and } \beta^* = c\overline{\beta} \text{ if } \overline{\mu} \leq \frac{bc}{a}\overline{\beta} \\
\mu^* &= \frac{a\overline{\mu} - bc\overline{\beta}}{1 - bd} \text{ and } \beta^* = \frac{c\overline{\beta} - ad\overline{\mu}}{1 - bd} \text{ if } \frac{bc}{a}\overline{\beta} \leq \overline{\mu} \leq \frac{c}{ad}\overline{\beta} \\
\mu^* &= a\overline{\mu} \text{ and } \overline{\beta} = 0 \text{ if } \overline{\mu} \geq \frac{c}{ad}\overline{\beta}
\end{aligned} \tag{2.6}$$

We are now ready to examine the matching process between all potential brides and grooms. We assume all parents have the same utility and thus the same decision functions. By plugging equilibrium values of μ^* and β^* from 2.6 into the utility function of both parents, we can compute the utility of all possible matches. Matching can then proceed as in Becker (1981). In general, there are many possible matching equilibria. This is because zero β and zero μ create ties: a groom with initial wealth $\overline{\mu}$ is indifferent between all brides for whom $\beta = 0$. To resolve these ties, we assume random assignment. As is well known, the matching equilibrium also depends on who moves first. For the purpose of illustration, we assume that the groom's parents move first.

With these assumptions, an equilibrium match can computed by letting the groom's parents sequentially choose the bride that yields the highest utility. Parents with the highest $\overline{\mu}$ choose first, parents with the next highest $\overline{\mu}$ move next, etc.; parents with the lowest $\overline{\mu}$ move last. When parents are indifferent between brides (i.e., they bring the same β), they are assumed to choose one at random. The match is an equilibrium because the bride married to the highest groom has a high combined value $\mu + \beta$ and could not obtain a higher utility with another groom. Applying this argument recursively to all brides, we see that no alternative allocation exists by which a bride and a groom would both be willing to switch. This is because no one could guarantee himself or herself a utility higher than the one guaranteed by the above scheme.

To illustrate how transfers from parents affect the distribution of wealth across newlyweds, we conduct a simulation exercise as follows. We posit values for ω and σ which are held constant across all iterations. For each iteration, we select N random realizations of $\overline{\mu}$ and $\overline{\beta}$ from a uniform distribution. For each pair of realizations of $\overline{\mu}_i$ and $\overline{\beta}_j$, we compute $\mu^*(\overline{\mu}_i, \overline{\beta}_j)$ and $\beta^*(\overline{\beta}_j, \overline{\mu}_i)$ using 2.6. We then compute the value of this union to the parents of the bride and groom $U_{i,j} = U(\overline{\mu}_i, \beta^*(\overline{\beta}_j, \overline{\mu}_i))$ and $V_{j,i} = V(\overline{\beta}_j, \mu^*(\overline{\mu}_i, \overline{\beta}_j))$. We then recursively apply the algorithm described in the previous paragraphs to match all brides and grooms. Let grooms be ranked by wealth so that $\overline{\mu}_1 > \overline{\mu}_2 > ... > \overline{\mu}_N$. We start by allocating to $\overline{\mu}_1$ the bride that gives utility $U(\overline{\mu}_1, \beta^*(\overline{\beta}_j, \overline{\mu}_1))$. In practice, this is the one with the highest $\overline{\beta}$ unless all brides contribute nothing ($\beta^* = 0$) in which case parents are indifferent. In this case, a bride is chosen randomly from the set of equivalent matches. The matched bride is then removed from the list of potential matches and we more to the next groom. The process is repeated until the last groom has been matched with the last bride.

Table 1. Results of Monte Carlo simulations[4]

	$\sigma = 0.2$		$\sigma = 1.5$	
A. Groom:	$E[b]$	$Var[b]$	$E[b]$	$Var[b]$
model 1: $\mu_i^* = a + b\beta_i^* + \varepsilon_i$	1.475	0.376	-6.402	2.047
model 2: $\mu_i^* = a + b\beta_i^* + c\overline{\mu}_i + \varepsilon_i$	-0.372	0.092	-0.598	0.169
B. Bride:				
model 1: $\beta_i^* = a + b\mu_i^* + \upsilon_i$	0.520	0.158	-0.234	0.083
model 2: $\beta_i^* = a + b\mu_i^* + c\overline{\beta}_i + \upsilon_i$	-0.421	0.086	-0.734	0.077

The solution is a series of matched pairs $\{\mu_i^*, \beta_j^*\}$. To illustrate the contradictory effects of parental

[4] These simulation results were obtained using 100 replications, each with 60 pairs of brides and grooms. Parental assets $\overline{\mu}$ and $\overline{\beta}$ are generated independently using a [0,100] uniform distribution. Welfare weights are 1 of grooms and 0.3 for brides. To avoid a perfect fit, noise is added to $\overline{\mu}$ and $\overline{\beta}$ afer matching using a uniform distribution [-5,5]. The true values of b are -0.5 for grooms and -0.56 for brides when $\sigma = 0.2$ and -0.5 and -0.81 when $\sigma = 1.5$.

transfers and assortative matching on the correlation between μ^* and β^*, we regress μ^* first on β^* alone and then on β^* and $\overline{\mu}$ jointly. In practice, we regress μ^* on β^* and $\hat{\mu} \equiv \overline{\mu} + \varepsilon$ where ε is measurement error. This is meant to capture the idea that the econometrician only has an imperfect measure of initial wealth. Without measurement error, a perfect fit is obtained in many cases, which is unrealistic.

Simulation results are summarized in Table 1 for various values of parameter σ. Results show that the simple correlation between μ^* and β^* depends on σ. If the elasticity of substitution σ between children and parents is high, μ^* and β^* tend to be negatively correlated: the substitution effect more than compensates for the assortative matching effect. In contrast, if σ is low, μ^* and β^* tend to be positively correlated. Observing a positive correlation between assets brought to marriage does not, by itself, rule out the existence of parental transfers. Once we control for initial wealth, however, the conditional correlation between μ^* and β^* is always negative.

Suppose, in contrast, that parents do not make transfers at the time of marriage in a way that takes into account the assets brought by the spouse. In this case, μ^* and $\overline{\mu}$ essentially coincide. Assortative matching is the only force at work here. It ensures that high $\overline{\mu}$ grooms are matched with high $\overline{\beta}$ brides. If we regressed μ^* on $\overline{\mu}$ and β^*, we would obtain a coefficient of 1 on $\overline{\mu}$ and 0 on β^*. However, if $\overline{\mu}$ is measured with error, the correlation between μ^* and β^* remains positive once we control for $\hat{\mu}$. This is because β^* contains additional information about unobservables through assortative matching.[5]

A test of parental transfers at marriage can thus be constructed by estimating equations 2.4 and 2.5. If only assortative matching is present, the coefficient on β^* and μ^* will be positive. If, however, parents transfer fewer assets at marriage when the spouse brings more, the coefficient on β^* and μ^* becomes negative once we control for $\overline{\mu}$ and $\overline{\beta}$, respectively. Estimating 2.4 and 2.5 forms the basis of our testing strategy.

So far we have assumed that parents do not adjust transfers at marriage to improve the ranking of their son or daughter in the marriage market. If parents act strategically in this sense, 2.6 no longer represents their optimal behavior. Bidding by parents to improve marriage market outcomes must be

[5] We have $\mu^* = \overline{\mu}$, $\beta^* = \overline{\beta}$, $\hat{\mu} = \overline{\mu} + \varepsilon$, and $\hat{\beta} = \overline{\beta} + \nu$. Due to assortative matching, β^* and μ^* are correlated, i.e., $\beta^* = m + n\mu^* + \upsilon$. Consequently, $\beta^* = m + n\overline{\mu} + \upsilon = m + n(\hat{\mu} - \varepsilon) + \upsilon$, from which we obtain that $-\varepsilon = (\beta^* - m - \upsilon)/n - \hat{\mu}$. We thus have $\mu^* = \hat{\mu} - \varepsilon = (\beta^* - m - \upsilon)/n$: the regression only captures assortative matching, hence $\hat{\mu}$ drops out and the coefficient on β^* is always positive. If β^* is also measured with error, $\hat{\mu}$ may contain information that is not included in β^* and may be significant as well.

taken into account. The basic structure of the resulting equilibrium is an auction-like outcome in which brides (and grooms) bring to marriage just as much as could credibly be offered by the next best bride.

This is best illustrated with the following thought experiment. Consider an economy with 2 grooms and 2 brides. Order them so that $\overline{\mu}_1 > \overline{\mu}_2$ and $\overline{\beta}_1 > \overline{\beta}_2$. Assume that welfare weights ω are such that brides bring less to marriage than grooms. As a result, brides have more to gain from switching rank. We therefore focus on brides' strategic behavior. Without strategic bidding, the utility of bride 2's parents for each possible marriage is:

$$V_{2,2} = \frac{1}{\rho}\left[(\overline{\beta}_2 - \beta^*_{2,2})^\rho + \omega(\mu^*_{2,2} + \beta^*_{2,2})^\rho\right] \tag{2.7}$$

$$V_{2,1} = \frac{1}{\rho}\left[(\overline{\beta}_2 - \beta^*_{2,1})^\rho + \omega(\mu^*_{1,2} + \beta^*_{2,1})^\rho\right] \tag{2.8}$$

where $\mu^*_{i,,j}$ and $\beta^*_{j,i}$ are the assets brought to marriage when groom i is matched with bride j. Since $\overline{\mu}_1 > \overline{\mu}_2$, in general $\mu^*_{1,2} > \mu^*_{2,2}$ and $V_{2,1} > V_{2,2}$. Other things being equal, $V_{2,1} - V_{2,2}$ is an increasing function of $\mu^*_{1,2} - \mu^*_{2,2}$: the more groom 1 brings to marriage relative to groom 2, the more bride 2 prefers groom 1.

For simplicity, suppose there is no tie so that groom 1 strictly prefers bride 1.[6] The question is whether bride 2 can lure groom 1 away from bride 1. The maximum $\beta^{\max}_{2,1}$ the parents of bride 2 would be willing to pay to switch to groom 1 is given by:[7]

$$\frac{1}{\rho}\left[(\overline{\beta}_2 - \beta^{\max}_{2,1})^\rho + \omega(\mu^*_{1,2} + \beta^{\max}_{2,1})^\rho\right] = V_{2,2} \tag{2.9}$$

It immediately follows that $\beta^{\max}_{2,1} > \beta^*_{2,1}$ and that $\beta^{\max}_{2,1}$ is an increasing function of $\mu^*_{1,2}$ and a decreasing function of $V_{2,2}$.[8] In order to keep groom 1, bride 1 must bring just a bit more than $\beta^{\max}_{2,1}$. Since by assumption, $\overline{\beta}_1 > \overline{\beta}_2$, doing so is less costly for the parents of bride 1 than for the parents of bride 2.

[6] This requires that $\beta^*_1 > \beta^*_2$ and thus that $\beta^*_1 > 0$.

[7] Strictly speaking we should allow groom 1 to adjust $\mu^*_{1,2}$ but, for the sake of this simple presentation, this complication is ignored. All we need is that $\mu^*_{1,2}$ remains higher than $\mu^*_{2,2}$.

[8] This is easily seen by totally differentiating 2.9. For instance, for $V_{2,2}$ we obtain (dropping some of the notation for improved reading):

$$\frac{d\beta^{\max}}{dV} = \frac{1}{-(\beta - \beta^{\max})^{\rho-1} + \omega(\mu^* + \beta^{\max})^{\rho-1}}$$

Since $\beta^{\max} > \beta^*$ and $\rho < 1$ by construction, the numerator is negative, which proves the claim.

The end result is that bride 1 keeps groom 1 but what bride 1 brings to marriage is now an increasing function of $\mu^*_{1,2}$ and a decreasing function of $V_{2,2}$, the utility of the lower ranked bride.[9]

This heuristic treatment of a 2×2 case illustrate how complex the equilibrium is likely to be. What is clear, however, is that the resulting equilibrium will not satisfy equations 2.4 and 2.5. With strategic bidding, β and μ also depend on assets held by other potential brides and grooms. To the extent that the econometrician does not control for this, it generates an omitted variable bias that, as before, generates a positive correlation between μ and β even after we control for $\overline{\mu}$ in equation 2.4. A similar problem affects equation 2.5.

In the rest of this paper we estimate equations 2.4 and 2.5 and we test whether the coefficient on β and μ are negative. If they are, this constitutes evidence that parents transfer wealth to their marrying children in part to compensate for assets brought by the spouse. If the coefficients are positive, this constitutes evidence either that parents do not transfer wealth at marriage, or that they act strategically. In the first case, the relationship between μ and β in equation 2.4 is entirely driven by assortative matching. In the second case, it is due to strategic bidding by parents who bid more if it helps them match their child with a more richly endowed spouse.

3. Study site and survey description

Having presented our conceptual framework and outlined our testing strategy, we purport to apply these ideas to marriage outcomes in rural Ethiopia. The choice of country is dictated by the fact that Ethiopia is primarily an agrarian economy where marriage market issues are important determinants of welfare. Ethiopia is indeed a low-income, drought-prone economy with the third largest population on the African continent. While some work has been done on South Asia (Foster 1996) and West Africa (Jacoby 1995), very little is known about marriage markets in East Africa. An additional attraction of Ethiopia as a study site is that it has extensive agro-ecological and ethnic diversity, with over 85 ethnic groups and allegiance to most major world and animist religions (Webb, von Braun and Yohannes 1992). This diversity should

[9] Since $\beta^{\max}_{2,1}$ is a decreasing function of $V_{2,2}$, in the case of multiple brides it is the utility of the lowest ranked bride that determines $\beta^{\max}_{2,1}$. However, a offer to give $\beta^{\max}_{2,1}$ need not be credible in this case if the lowest rank bride could obtain a higher utility at lower cost from a lower ranked male. This illustrates that the strategic equilibrium is, in general, quite complicated.

provide enough variety in marriage market outcomes to identify important determinants.

For our analysis, we rely on the 1997 Ethiopian Rural Household Survey (ERHS) which was undertaken by the Department of Economics of Addis Ababa University (AAU) in collaboration with the International Food Policy Research Institute (IFPRI) and the Center for the Study of African Economies

(CSAE) of Oxford University. The 1997 ERHS covered approximately 1500 households in 15 villages across Ethiopia, capturing much of the diversity mentioned above. While sample households within villages were randomly selected, the choice of villages themselves was purposive to ensure that the major farming systems were represented. Thus, while the 15 sites included in the sample may not be statistically representative of rural Ethiopia as a whole, they are quite representative of its agro-ecological, ethnic, and religious diversity.

The questionnaire used in the 1997 round includes a set of fairly standard core modules, supplemented with modules specifically designed to address intrahousehold allocation issues, particularly conditions at the time of marriage. These modules were designed not only to be consistent with information gathered in the core modules, but also to complement individual-specific information. These modules were pretested by the authors in February/March 1997 in four non-survey sites with a level of ethnic and religious diversity similar to the sample itself. Data collection took place between May and December 1997. Questionnaires were administered in several separate visits by enumerators residing in the survey villages for several months. Careful data cleaning and reconciliation across rounds were undertaken in 1998 and 1999 by Bereket Kebede and IFPRI staff.

The intrahousehold modules collect information on: the parental background and marriage histories of each spouse; the circumstances surrounding the marriage (e.g. type of marriage contract, involvement in the choice of a spouse); and the premarital human and physical capital of each spouse. A variety of assets brought to the marriage were recorded, as well as all transfers made at the time of marriage. These questions, which were asked separately for each union listed by the household head, pertained to assets brought to marriage by the head and his spouse(s) (or if the household head was female, for herself and her last husband). Questions were as exhaustive as possible; they covered the value and quantity of land and livestock, as well as the value of jewelry, linen, clothing, grains, and utensils that each spouse brought to marriage. In the analysis, values at the time of marriage are converted to current values using the consumer price index. Given the difficulties inherent in a long recall period and in the choice of an inflation correction factor suitable for all 15 villages, these values are likely to be measured with error. We also collected information on the value of the house brought to marriage by each spouse, if any. Although questions were asked about cash as well, they yielded very few responses, if any. This is because accumulation in the form of cash or financial instruments is essentially absent in the study area. Questions were asked about transfers from the bride's and groom's families at the time of marriage, whether to the couple, or to a specific individual. Parental background information was collected for each spouse and each union; these included landholdings of the parents at the time the household head was married, as well as educational attainment of each parent of each spouse. Human capital characteristics of each spouse included age, education, and experience in three categories of work prior to marriage: farm work, wage work, and self-employment.

One asset, land, deserves a few words of caution. For some twenty years prior to the survey, rural land was owned by the Ethiopian state and distributed to individual farmers by the Peasants' Association (PA), a local authority operating at the village level. Land is then periodically reallocated between farmers to accommodate the needs of young couples. Between these reallocations, farmers hold full user rights on the land. In practice, reallocations have occurred rather infrequently. Different regions also seem to have interpreted the law differently, some opting for a collectivist approach while others essentially followed the old system of inheritance (e.g. The World Bank 1998, Gopal and Salim 1999). Young couples typically obtain land through their parents, either directly (gift or land loan) or indirectly by having their parents lobby the PA. It is also worth noting that, although the sale of agricultural land has been illegal in Ethiopia for over twenty years, virtually all surveyed households were able to value the land they had brought to marriage. This leads us to expect that, in rural Ethiopia, parents continue to determine the land base of newly formed couples.

Table 2 breaks down the sample by household category. We see that twenty percent of surveyed households are headed by unmarried individuals, most often divorced or widowed women. Monogamous couples living together represent some 62% of the sample. Polygamous households – or parts thereof –

account for 7.6% of the sample, while separated couples account for the remaining 9%. Starting from these household level data, we construct a marriage data set that contains information recorded for each union separately. The rest of the analysis presented here is based on this union-level data set.

Survey results show that grooms bring nearly ten times more assets than brides to the newly formed family unit (Table 3), an average of 4,270 Birr (in 1997 prices), compared to 430 birr for brides. For grooms, land is the asset with the highest average value. The next most valuable asset is livestock, followed by grain stocks and other minor assets. In contrast, brides bring very little land to the marriage. They bring some livestock but less than grooms. Two-thirds of the brides report bringing no asset to marriage. Gifts at the time of marriage are distributed more evenly between the groom and the bride but they are very small relative to assets brought to marriage, except for the bride where they are roughly equivalent. The survey area can thus be described as a system where grooms bring most of the start-up capital of the newly formed household.

4. Estimation results

We are now ready to proceed with estimation of equations 2.4 and 2.5. For a couple with husband i and wife j, the model to be estimated is of the form:

$$\mu_i = a_i\overline{\mu}_i + b_i\beta_j + u_i \geq 0 \quad (4.1)$$

$$\beta_j = c_j\overline{\beta}_j + d_j\mu_i + u_j \geq 0 \quad (4.2)$$

where $a_i = \frac{\omega_i^\sigma}{1+\omega_i^\sigma}$, $b_i = \frac{-1}{1+\omega_i^\sigma}$, $c_j = \frac{\omega_j^\sigma}{1+\omega_j^\sigma}$, and $b = \frac{-1}{1+\omega_j^\sigma}$. To capture the fact that parents give much less to brides than to grooms, we let welfare weights differ for brides and grooms.

From equation 2.1, we know that $\overline{\mu}_i \equiv w_i^p + w_i^c$. We measure parental wealth w_i^p using land owned by parents and father's education. To avoid spurious correlation, we measure w_i^c primarily in terms of human capital: schooling, age at marriage, and work experience at marriage. These variables are predetermined and are not affected by compensating parental transfers at the time of marriage. We also include the number of previous marriages because we suspect that they affect asset accumulation before a new marriage, particularly for women. The dependent variables μ_i and β_j are the value of all assets brought to marriage by the bride and the groom; they are constructed as described in the previous section. They include the value of all the physical assets that form the start-up capital of the newly created household.

Sample correlation coefficients between μ_i and β_j are significantly positive. This is consistent with assortative matching and does not support the idea of compensating parental transfers with a large value of σ. To test compensating transfers, it is therefore necessary to rely on equations 4.1 and 4.2. Regression estimates are reported in Table 4. The model is estimated in levels, as stipulated in equations 4.1 and 4.2. As a robustness check, we also estimate the model in logs, in which case the dependent variable as well as assets brought by the spouse and father's land enters the regression in log. The estimator is tobit.[10]

Dummies are included for each village. Because we suspect village effects to vary over time, we cross village dummies with the decade in which the marriage took place. Decades are calculated from the time of the survey, i.e., 1997. So, marriages in village 1 taking place between 1988 and 1997 have one dummy, while marriages in the same village taking place between 1978 and 1987 have another dummy variable. A total of $15 \times 4 = 60$ dummies is included in the regressions.

Estimation results are broadly consistent across the model in level and in logs but the model in log provides a better fit. We obtain large positive values for b_i and d_j, both in levels and in logs. This constitutes *prima facie* rejection of the compensating transfers model presented in Section 2. Parental land has a positive effect on assets brought to marriage by both bride and groom while parental education has no effect. Age and the number of previous unions in general have a positive effect on assets brought to marriage, reflecting individual accumulation by the spouses. Experience in wage work is negative for men, suggesting that men who work for a wage are less capable to accumulate assets than farmers.

Parents presumably divide their assets among their children so that, other things being equal, grooms with more brothers and sisters should receive less. Competition among siblings may be correlated with matching outcomes in such a way as to invalidate our results. To test for this possibility, we reestimate

[10] Similar results are obtained using censored least-absolute deviation regressions, but village-decade dummies make estimation difficult. In the log model, assets at marriage appear as $\log(\mu_i + 1)$ and $\log(\beta_i + 1)$.

the model with sibling effects. We assume that welfare weights vary as a function of the number of siblings. In practice, this means that a_i and b_i vary systematically with the number of siblings of the groom. This effect is captured by including cross terms between number of siblings and $\overline{\mu}_i$ and β_j. The same apply to brides. Because daughters bring much less to marriage, we focus on competition with brothers.[11] To keep the model sparse, we only include the most important cross terms.

Results with sibling effects are presented in Table 5. As expected, in the level regression we find that parental land crossed with number of siblings has a negative sign for grooms. This means that grooms with more brothers receive less from their parents. The effect is not significant, however. Contrary to expectations, we find that β_j and μ_i crossed with siblings have positive signs: spouses with more siblings bring more to marriage if their spouse brings more. We cannot think of a reasonable explanation for this result other than a assortative matching effect: grooms with more siblings have more wealth and are thus attract brides with more wealth. Except for the groom regression in levels, however, sibling effects are neither individually or jointly significant.

For inference based on equations 4.1 and 4.2 to yield correct conclusions, $\overline{\mu}_i$ and $\overline{\beta}_j$ must not be measured with error. Matching on unobservables in the marriage market ensures that assets brought by the bride are positively correlated with unobservable assets of the groom. The presence of errors of measurement in $\overline{\mu}_i$ therefore biases the coefficient of β_i in 4.1. Whenever the dependent variable μ_i and regressor β_j are positively correlated because of matching on unobservables, the coefficient of β_j is biased toward a positive value. The same thing happens for μ_i in equation 4.2. For our test to be conclusive, it is therefore necessary to instrument β_j and μ_i in their respective regression.

In order to instrument β_j in equation 4.1 we need regressors that help predict assets brought to marriage by the bride $E[\beta_j]$ but are independent of unobservable characteristics of groom i. For this purpose, we rely on the fact that assortative matching varies across villages and over time: grooms with similar observable characteristics in different villages are matched with brides with different wealth. Not only is the level different, but also the slope of the assortative matching relationship. It is this difference in slopes that we use to instrument β_j. The validity of this instrumentation procedure rests on the

[11] We also experimented with the number of sisters, but they are never significant.

assumption that the slope of parental behavior does not vary across villages and time periods. We feel this is a reasonable assumption given the data at hand and our desire to identify behavior that is robust across villages.

Results with instrumented $\hat{\beta}_j$ and $\hat{b}_i$ are reported in Table 6. Other regressors are unchanged. We again obtain a strong positive estimated coefficients for b_i and d_j in the levels regression, hence rejecting the compensating parental transfer model without strategic behavior. Results in logs still show a positive relationship but the coefficient is no longer significant. As discussed in Section 2, there are two potential interpretations for these positive coefficients: either (1) all we observe is due to assortative matching; parental transfers do not serve a compensating role; or (2) parents act strategically. In Section 3 we have seen that parents do transfer wealth to their children at marriage. This constitutes circumstantial evidence against the first interpretation. It remains conceivable, however, that parents endow their children prior to marriage and do not adjust their transfer after marriage market outcomes are realized.

5. Testing strategic behavior

To try to disentangle the two explanations, we construct a test of strategic behavior. This test is based on the idea that, if parents act strategically, the slope of expected marriage market outcomes should affect their behavior. The intuition behind this idea is that strategic parents transfer more if doing so dramatically increases the quality of the match for their child. This is equivalent to saying that parents adjust their transfers not only in response to assets brought by the spouse but also in response to how easily they can obtain a better match.

To show this formally, we amend the parental transfer model to include a slope effect. Let the conditional expected match be written:

$$E[\beta|\mu] = g(\mu) \tag{5.1}$$

In contrast with the compensating transfer model, we now assume that parents do not take β as given but anticipate the effect that μ has on β. The amended optimization problem is:

$$\max_{0 \leq \mu \leq \bar{\mu}} \frac{1}{\rho}[(\bar{\mu} - \mu)^{\rho} + \omega(\mu + g(\mu))^{\rho}]$$

Solving the first order condition yields a modified equation 2.4:

$$\mu^* = \frac{(1+g'(\mu))^\sigma \omega^\sigma \overline{\mu} - \beta^o + g'(\mu)\mu^o}{1+g'(\mu)+(1+g'(\mu))^\sigma \omega^\sigma} \geq 0 \tag{5.2}$$

A similar condition can be derived from brides.

To transform equation 5.2 into a relationship that can be used estimation purposes, we take a first-order Taylor approximation of $g(\mu)$ around $\{\mu^o, \beta^o\}$:

$$g(\mu) \simeq \beta^o + g'(\mu^o)(\mu - \mu^o) \tag{5.3}$$

We think of equation 5.1 as a local linear approximation to the true matching relationship around the parental optimum with $\mu^* = \mu^o$ and $\beta = \beta^o$. The term $g'(\mu^*)$ measures the slope of the matching relationship at μ^*. To simplify the notation, let κ stand for $g'(\mu^*)$, keeping in mind that κ varies across individuals depending on the marriage market they face. Equation 5.2 can then be rewritten as:

$$\begin{aligned} \mu^* &= \frac{(1+\kappa)^\sigma \omega^\sigma \overline{\mu} - \beta + \kappa\mu^*}{1+\kappa+(1+\kappa)^\sigma \omega^\sigma} \\ &= \overline{\mu}\frac{(1+\kappa)^\sigma \omega^\sigma}{1+(1+\kappa)^\sigma \omega^\sigma} - \beta\frac{1}{1+(1+\kappa)^\sigma \omega^\sigma} \end{aligned} \tag{5.4}$$

which again is linear in $\overline{\mu}$ and β. The only difference is the presence of the $(1+\kappa)^\sigma$ term. When the matching function is steep and κ is large, parents can significantly improve their child's marriage prospect by giving more: the coefficient of $\overline{\mu}$ increases in κ while the coefficient of β decreases. Given an estimate of κ for each bride and each groom, we could evaluate equation 5.4 using non-linear least squares. As it turns out, both $\frac{(1+\kappa)^\sigma \omega^\sigma}{1+(1+\kappa)^\sigma \omega^\sigma}$ and $\frac{1}{1+(1+\kappa)^\sigma \omega^\sigma}$ can easily be approximated by a log-linear function in κ.

To estimate 5.4, we need an individual-specific estimate of κ, the slope of the matching relationship. If parents form rational expectations, $E[\beta|\mu]$ is equal to the actual matching relationship. It is therefore possible to obtain an approximation to the local curvature of $E[\beta|\mu]$ from the empirical matching relationship. With this idea as starting point, we proceed as follows. We first generate a non-parametric estimate of $E[\beta_j|\mu_i]$ by fitting a kernel regression separately for each village. Let this estimate be written

β_j^e. This estimate is then used in combination with μ_i pairs to compute local slopes.[12]

Before being used in 5.4, the resulting slope estimates finally need to be purged from endogeneity bias. The reason is that β_j^e and hence slopes were calculated on the basis of the dependent variable μ_i. This generates the possibility of spurious correlation if higher values of μ_i are associated with steeper slopes. To eliminate this bias, we instrument β_j^e (or rather its log) using $\overline{\mu}_i$ separately for each village-decade group. As a whole, this approach guarantees that we only using information about individual assets in constructing our estimate of the slope of $E[\beta|\mu]$, not information about the actual match.[13]

Estimation results for 5.4 using these slopes are presented in Table 7. Results are quite different for brides and grooms. For grooms, slope effects are negative and non-significant. The value of assets brought by the bride has a positive coefficient, although as in Table 6 the significance of this coefficient drops below standard levels in the log regression. In contrast, for brides the instrumented slope variable has a strongly significant positive coefficient, while the coefficient on assets brought by the husband becomes non-significant and, in the log regression, negative.

These results indicate that strategic behavior may be present, but only with respect what parents give to brides. Regarding grooms, the bulk of the evidence suggests that assets brought to marriage are not affected by marriage market outcomes except via assortative matching. For brides, there is some evidence that certain parents give more to their daughter to improve their marriage prospects, as predicted by our model with strategic behavior. But we find no strong evidence that parents reduce transfers to daughters at marriage in view of their realized match.

Taken together, the evidence suggests that, contrary to the compensating transfer model presented in Section 2, parents do not take marriage market outcomes into account when they set the assets brought to marriage by their child. It is as if parents first decide how much to endow their child, and then look for a marriage prospect. As a result, the data reflects primarily assortative matching. The only

[12] The kernel regression is calculated for each village separately using a least squares Epanechnikov kernel and a bandwidth of 0.8. For most points, slopes are computed by linear interpolation using the two nearest neighbors. For extremum observations, we use only a single nearest neighbor. For ranked observations with zero assets brought by spouse, the slope is set to zero. For ranked observations with zero assets brought by individual, the expected assets brought by the spouse is the average assets over all individuals with zero assets. In this case, the slope is calculated relative to the nearest neighbor with strictly positive assets brought by spouse. For villages with no variation, the slope is zero. These observations do not affect estimation of 5.4 because of the inclusion of village-decade dummies.

[13] Because of the presence of noise in the data, predicted values $\widehat{\beta}_j^e$ occasionally take negative values. Such values seem to suggest that parents could improve marriage market outcomes by transfering less, something we find extremely unlikely. For this reason, we set all negative values of $\widehat{\beta}_j^e$ to 0.

exception concerns brides. Certain parents appear to give more assets to their daughter whenever doing so dramatically improves their marriage outcome.

6. Conclusion

We have examined the determinants of assets brought to marriage. These determinants indeed shape the distribution of assets and incomes in agrarian societies characterized by widespread poverty – hence where it is difficult to accumulate. Assets at marriage also affect farm size distribution since newlyweds typically initiate their own, separate farming operations. Assets brought at marriage thus constitute the dominant form of start-up capital for new farms.

Using a simple model of parental transfers (inter vivos bequest) at marriage, we identified three separate processes that determine assets brought to marriage. The first process is assortative matching, that is, the tendency for wealthier brides to marry wealthier grooms. Assortative matching generates a positive correlation between assets brought to marriage by both spouses. The second process is compensating parental transfers at marriage. If these transfers are partly determined by marriage market outcomes, assets brought by, say, a bride will have a negative effect on assets brought by the groom once we control for individual characteristics of the groom. The reason is that parents adjust their transfers to compensate for marriage market outcomes. The third process is what we called strategic behavior, that is, parents' attempt to improve marriage market outcomes by giving more assets to their children.

Using detailed data from rural Ethiopia, we examined marriage patterns for evidence of these three processes. Like other studies, we found overwhelming evidence of assortative matching. We test for evidence of sibling competition but do not find any: spouses with lots of siblings do not bring less to marriage than those without. This is probably because two effects cancel each other: competition between siblings for parental resources should reduce assets brought to marriage, but risk sharing and other sibling externalities increase them. Moreover, it is possible that wealthier parents will have larger completed family sizes so parental wealth is correlated with the number of siblings.

We have also investigated parental transfers at marriage. At first glance, the fact that grooms bring on average ten times more to marriage than brides is consistent with the idea that parental transfers at marriage depend on marriage market outcomes. Indeed, one may argue that it is because grooms bring more that brides bring less. If true, this relationship should also hold at the individual level: a bride who marries a poor groom should receive more from her parents to compensate for her lack of luck in the marriage market. We develop a way of testing this idea formally but find no evidence that this is the case. Parents do not adjust their transfers to compensate for marriage market outcomes.

Finally, we tested whether Ethiopian parents behave strategically when they endow their children. If they do, parents who face a steeper marriage matching curve would give more than parents whose gifts would have little or no influence on marriage prospects. Having obtained estimates of the slope of the marriage matching curve, we find some evidence that parents behave strategically when they marry a daughter, but not when they marry a son.

This paper helps clarify the determinants of assets brought to marriage in a world where these assets have a decisive influence on subsequent household welfare. The results presented here need to be verified in other settings and with larger data sets before they are deemed fully conclusive. But the methodology developed in these pages illustrates how this can be done.

Taken together, our work indicates that the marriage market model provides a reasonable approximation of what goes on in rural Ethiopia. To complete the picture, one would need to know how much social mobility there is after marriage, e.g., how fast households can accumulate assets, and how easily they can switch to higher income paths. Given the predominantly agrarian nature of the surveyed area and the relative lack of remunerative non-farm activities, we suspect that social mobility is low. This issue deserves more investigation.

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Table 2. Composition of the sample by category of household

	Number	Percent	
Unmarried individuals			
Single man living alone	72	5.1%	
Single woman living alone	239	16.8%	
Monogamous couples			21.9%
Monogamous couple living together	877	61.8%	
Monogamous couple, husband away	69	4.9%	
Monogamous couple, wife away	55	3.9%	
Polygamous households			70.5%
Polygamous household living together	81	5.7%	
Male headed part of a polygamous couple residing separately	21	1.5%	
Female headed part of a polygamous couple residing separately	6	0.4%	
			7.6%
Total	1420		

Table 3. Assets at marriage, Inheritance, Human Capital, and Parental Characteristics

	Groom's assets			**Bride's assets**		
Assets brought to marriage:	Mean	SD	Median	Mean	SD	Median
Land value	2056	5955	377	90	833	0
Livestock value	1337	2833	287	300	1790	0
Jewelry, clothes, linens, utensils and grain	877	1587	448	40	232	0
Total value of assets prior to marriage	4270	7433	1981	430	2035	0
Gifts at marriage (1)	234	761	0	401	885	0
Inheritance after marriage:						
Inherited land	2060	8452	0	75	657	0
Inherited livestock	260	1038	0	80	346	0
Total assets at marriage plus inheritance	6820	11848	3576	987	2395	342
Human capital						
Age at marriage	29.9	11.7	27.3	19.3	8.1	18.3
Literate (2)	33%		0%	13%		0%
At least some primary education	25%		0%	10%		0%
At least some secondary education	7%		0%	2%		0%
Years of farming experience	11.7	10.3	10.0	3.7	5.8	1.0
Years of wage work experience	0.7	2.5	0.0	0.1	0.7	0.0
Years of self-employment experience	0.8	2.9	0.0	0.3	1.5	0.0
Parental characteristics						
Father's land (in hectares)	6.5	74.0	0.6	1.9	9.9	0.4
Father went to school (yes=1)	7%		0%	7%		0%
No. of observations	1179					

All unions included. All values expressed in 1997 Ethiopian Birr.
(1) Gifts made to bride and groom only. A few gifts given to both jointly are divided equally for the purpose of this table.
(2) Either some formal education or some literacy or religious education.

Table 4. Assets brought to marriage

	Groom				Bride			
	in levels		in logs		in levels		in logs	
Assets brought by spouse	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**
Value of assets brought by spouse (*)	0.90	**5.73**	0.247	**7.09**	0.06	**4.31**	0.355	**4.46**
Determinants of parental and personal wealth								
Land of father (*)	14.51	**1.72**	0.175	**1.69**	0.57	0.15	0.598	**2.59**
Years of education of father	168.92	0.20	-0.027	-0.08	-634.42	-1.60	-0.595	-0.79
Age at marriage	77.44	**3.42**	0.023	**2.70**	-0.06	-0.13	-0.000	-0.39
Number of previous union	176.85	0.82	0.130	1.57	522.30	**5.00**	1.159	**5.79**
Years of schooling	208.13	**1.80**	0.037	0.83	-87.85	-0.93	-0.111	-0.63
Log of years of wage work experience	-987.85	**-2.72**	-0.459	**-3.31**	-15.54	-0.03	0.761	0.83
Log of years of self-employment exper.	353.33	1.00	0.220	1.63	200.00	0.77	0.830	**1.71**
Village x decade dummies	included but not shown							
Intercept	-3395.9	**-1.67**	3.018	**3.84**	-206.8	-0.37	0.858	0.73
Selection-term	6504.5		2.513		2596.8		5.100	
Pseudo R-squared	0.011		0.041		0.037		0.130	
Number of observations	993		993		1150		1150	
of which censored	90		90		701		701	
of which uncensored	903		903		449		449	

(*) in log regressions, land of father and assets brought by spouse appear in log (x+1).

Table 5. Testing sibling effects	Groom				Bride			
	in levels		in logs		in levels		in logs	
Assets brought by spouse	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**
Value of assets brought by spouse (*)	0.37	1.61	0.280	**4.98**	0.06	**1.85**	0.436	**2.93**
Determinants of parental and personal wealth								
Land of father (*)	25.54	**1.76**	0.026	0.16	-6.87	-0.44	0.059	0.13
Years of education of father	71.14	0.08	-0.024	-0.07	-622.66	-1.57	-0.560	-0.75
Age at marriage	70.78	**3.07**	0.025	**2.84**	-0.06	-0.12	-0.000	-0.47
Number of previous union	169.64	0.79	0.134	1.61	537.75	**5.12**	1.183	**5.90**
Years of schooling	195.28	**1.69**	0.035	0.79	-87.98	-0.94	-0.109	-0.62
Log of years of wage work experience	-939.37	**-2.59**	-0.472	**-3.40**	-20.40	-0.04	0.800	0.88
Log of years of self-employment exper.	320.72	0.91	0.217	1.61	195.66	0.75	0.824	**1.70**
Sibling effects								
Log of number of brothers	-279.39	-0.72	0.026	0.14	191.33	0.82	0.455	0.42
ln(# of brothers) x land of father (*)	-6.66	-0.86	0.160	1.19	7.27	0.49	0.604	1.40
ln(# of brothers) x assets brought by bride (*)	0.80	**3.15**	-0.038	-0.80	-0.00	-0.13	-0.097	-0.69
Village x decade dummies				included but not shown				
Intercept	-2954.1	-1.40	2.992	**3.65**	-404.4	-0.66	0.481	0.32
Selection-term	6466.6		2.511		2593.2		5.075	
Pseudo R-squared	0.012		0.042		0.038		0.132	
Number of observations	993		993		1149		1149	
of which censored	90		90		700		700	
of which uncensored	903		903		449		449	
	F-test	p-value	F-test	p-value				
Test whether sibling effects jointly significant	**3.51**	0.0149	0.72	0.5426	0.7316	0.43	0.4576	0.87

(*) in log regressions, land of father and assets brought by spouse appear in log (also in the cross terms).

Table 6. Instrumenting assets brought by the spouse

	Groom				Bride			
	in levels		in logs		in levels		in logs	
Assets brought by spouse	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**
Value of assets brought by spouse (*),(**)	1.51	**3.46**	0.081	1.54	0.06	**2.14**	0.031	0.22
Determinants of parental and personal wealth								
Land of father (*)	13.90	1.63	0.178	**1.67**	0.50	0.13	0.596	**2.51**
Years of education of father	80.93	0.09	-0.046	-0.14	-708.98	**-1.76**	-0.447	-0.59
Age at marriage	78.03	**3.42**	0.022	**2.42**	-0.11	-0.23	-0.000	-0.40
Number of previous union	181.52	0.83	0.150	1.77	546.20	**5.18**	1.123	**5.54**
Years of schooling	216.89	**1.85**	0.053	1.17	-100.35	-1.06	-0.127	-0.71
Log of years of wage work experience	-998.82	**-2.72**	-0.393	**-2.77**	-24.05	-0.05	0.935	1.02
Log of years of self-employment exper.	426.65	1.20	0.231	**1.67**	222.46	0.85	0.754	1.52
Village x decade dummies			included but not shown					
Intercept	-3469.1	**-1.69**	3.610	**4.39**	-207.9	-0.37	2.623	**1.82**
Selection-term	6571.0		2.575		2625.8		5.182	
Pseudo R-squared	0.01		0.031		0.04		0.125	
Number of observations	993		993		1152		1152	
of which censored	90		90		702		702	
of which uncensored	903		903		450		450	

(*) in log regressions, land of father and assets brought by spouse appear in log (x+1).
(**) instrumented; see text for details.

Table 7. Including slope effects	**Groom**				**Bride**			
	in levels		**in logs**		**in levels**		**in logs**	
Assets brought by spouse	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**	**Coef.**	**t-stat.**
Value of assets brought by spouse (*),(**)	0.90	**5.70**	0.07	1.40	0.06	**2.18**	0.01	0.09
Determinants of parental and personal wealth								
Land of father (*)	14.20	**1.66**	0.18	**1.68**	0.81	0.22	0.61	**2.60**
Years of education of father	95.35	0.11	-0.03	-0.10	-778.92	**-1.92**	-0.71	-0.94
Age at marriage	78.08	**3.42**	0.02	**2.41**	-0.17	-0.35	-0.00	-0.60
Number of previous union	182.54	0.84	0.15	**1.79**	534.31	**5.05**	1.07	**5.33**
Years of schooling	216.79	**1.85**	0.05	1.18	-97.03	-1.03	-0.11	-0.65
Log of years of wage work experience	-983.78	**-2.67**	-0.38	**-2.67**	12.53	0.02	1.10	1.19
Log of years of self-employment exper.	425.86	1.20	0.23	**1.67**	174.43	0.66	0.56	1.12
Slope effect								
Slope of matching function (***),(**)	-11084	-0.55	-10.45	-1.32	1210.9	**1.96**	4.48	**3.78**
Village x decade dummies								
Intercept	-2630.7	-1.03	4.43	**4.31**	-350.4	-0.61	2.22	1.54
Selection-term	6570.0		2.57		2627.6		5.14	
Pseudo R-squared	0.01		0.03		0.04		0.13	
Number of observations	993		993		1152		1152	
of which censored	90		90		702		702	
of which uncensored	903		903		450		450	

(*) in log regressions, land of father and assets brought by spouse appear in log (x+1).
(**) instrumented; see text for details.
(***) estimated using hypothetical matching; see text for details.