

# Why Dowries?<sup>1</sup>

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## **Abstract**

When married daughters leave their parental home and their married brothers do not, altruistic parents provide dowries for daughters and bequests for sons in order to solve a free riding problem between their married sons and daughters. The theory has predictions on the form of the dowry contract, the effect of family demographics on the value of the dowry, and the decline of dowries in previously dowry giving societies. The theory is consistent with cross-section dowry data from medieval Italy. It is also consistent with the factors that led to the decline of dowries in São Paulo, Brazil.

Keywords: dowries, bequests, free-riding, virilocal, medieval, Tuscany.

JEL classification: J1, N3.

# 1 Introduction

Parents transfer wealth to their children in many ways. The dowry is distinctive because it is a large transfer made to a daughter at the time of her marriage (Appendix A provides a brief survey of dowries and their historical context).<sup>1</sup> In an insightful essay, Goody (1973) proposed that the dowry is a pre-mortem inheritance to the bride. That is, parents transfer wealth to their daughters primarily in the form of dowries rather than bequests whereas they transfer wealth to their sons primarily in the form of bequests. His observation has been confirmed in different dotal (dowry giving) societies (Carroll 1991; Chen; Hughes). We develop a theory of dowries that explains his observation. Our work builds on Becker's seminal research on marriage markets, summarized in Becker (1991), and the research program on economics of the family (Rosenzweig and Stark 1997).

A theory of dowry has to be consistent with the role of wealth in the marriage market. There is substantial evidence for assortative matching by wealth or its proxies in the marriage market.<sup>2</sup> Assortative matching may be rationalized by productive complementarity between own and spousal wealth in household production (Becker; Siow and Zhu (2000); Weiss (1997)), and the public goods nature of own and spousal wealth in a marriage (Lam 1988; Peters and Siow (2000)). The standard economic model of the dowry, as a spot price which clears the marriage market, fits into the assortative wealth matching framework (Anderson; Becker; Botticini 1999; Edlund 1998; Grossbard-Shechtman 1993; Rao). Its users often note the substitutability between dowry and a bride's other attributes in determining her expected wealth contribution in marriage (e.g. Boserup 1970; Rao).

Still, the question of dowry is brought into sharp relief in the above description of the marriage market. There are many ways for parents to transfer wealth to their children. Within a dotal society, why use dowries for daughters and not for sons? Why are dowries used in some societies and not in others?

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<sup>1</sup>Dotal marriages were common in Europe (Hughes 1978), East Asia (Chen 1985; Ebrey 1991) and the Americas (Korth and Flusche 1987; Nazzari 1991). It remains widespread in South Asia (Anderson 1998; Rao 1993) and parts of Mediterranean Europe (Goody 1990; Harrell and Dickey 1985).

<sup>2</sup>Abdelrahman (1994); Dobson et al. (1998); Jaffee and Chacon-Puignau (1995); Mare (1991); Qian and Preston (1993); Sanchez-Andres and Mesa (1994).

We argue that in virilocal societies, where married daughters leave the parental home and their married brothers do not, altruistic parents use dowries and bequests to solve a free riding problem between siblings. In these societies, married sons continue to work with the family assets after their marriage. Since married sons live with their parents, they have a comparative advantage in working with the family assets relative to their married sisters. Absent any incentive problem, altruistic parents should not give any dowry but rather give the daughters their full share of the estate when the parents die. But if married daughters fully share in the parents' bequests, the sons will not get the full benefits of their efforts in extending the family wealth and therefore will supply too little effort. In order to mitigate this free riding problem, altruistic parents give dowries to daughters even though daughters are less efficient in using these assets. While bequests are more efficient for distributing wealth to daughters, they have poor incentive effects for sons. Thus parents will want to choose dowries that are large enough, and consequently bequests which are small enough, to mitigate the incentive for their sons to reduce effort. While our theory may sometimes predict that daughters will not receive any bequest, this does not necessarily imply that daughters' welfare are lower than that of their brothers.

Dowry contracts are heterogeneous (Appendix A). Due to the free riding problem, our model suggests that dowry contracts, which may be complicated, should not contain claims on shares of income generated with the family assets. In other words, a married daughter may not be only discriminated against in her parents' bequests as observed by Goody. Our model predicts that she may also be excluded from inter vivos claims on income generated from her natal family's assets.

When bequests affect children's wealth, family demographics affect dowry values. The bride's parents have to forecast the bequest due to a prospective son-in-law in order to determine his expected wealth. Similarly, the groom's parents have to forecast the likelihood of a prospective daughter-in-law getting further non-dowry transfers in order to determine her expected wealth. The number and gender composition of the siblings of a prospective spouse will affect his or her expected wealth, and therefore the dowry that she will give or the dowry that he will receive.

A theory of dowry has also to explain its disappearance in previously dotal societies. As the labor market in a dotal society becomes more developed, as the demand for different types of workers grow, children are less likely to work in the same occupation as their parents. They are also less likely

to work for their families. The return to investing in human capital also increases. The use of bequests to align work incentives within the family becomes less important. Since it is costly to provide a dowry, the demand for dowry (within the family) will fall as the need to use bequests to align the work incentives of sons falls. Instead of the dowry, parents will transfer wealth to both their daughters and sons as human capital investments and bequests. Therefore, the development of labor markets will be important in reducing the role of dowries.

We test our model of dowries with two types of evidence. The primary source of evidence comes from marriage contracts written by notaries in early Renaissance Tuscany and the Florentine *catasto* (census) of 1427 housed at the State Archives of Florence.<sup>3</sup> We use these data sets to test the model's prediction on the form of the dowry contracts, the relationship between family demographics and dowry values, and the nature of bequests for daughters. The evidence from Tuscany provides support for the model.

Currently, we do not have data on the decline of dowries in Tuscany. In general, there is little data on the decline of dowries in a society due to the large time span of historical data needed to track its decline. A singular exception is the insightful study by Nazzari (1991) who studied the decline of dowries in São Paulo, Brazil, from 1600 to 1900. Although her theory is different from ours, the factors which Nazzari considered as responsible for the decline of dowries in São Paulo are consistent with our model.

There is a sense in which Goody's observation is misleading. As long as dowries are used primarily in virilocal societies, we will observe a gender asymmetry in *inter vivos* transfers of wealth from parents to their married children. The reason is that dowries are observed by outsiders whereas *inter vivos* transfers to married sons are unlikely to be observed since they continue to live with their parents. Moreover, bequests to sons are necessarily larger if wealth which belong to the sons is considered by outsiders as belonging to the parents' estate. *Inter vivos* transfers to married sons may be larger than dowries and parental bequests of their own wealth to sons may be relatively small. Yet researchers may "observe" that parents transfer wealth to their daughters primarily in the form of dowries and wealth to their sons primarily in the form of bequests.

The anthropological literature on the relationship between the economic

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<sup>3</sup>This data was collected and used by Botticini to provide the first study on the determination of dowry values in medieval Tuscany using micro data.

environment, forms of intergenerational wealth transfers and family structure is large, rich and suggestive (Gaulin and Boster 1990; Goody 1976; Goody, Thirsk et. al. 1976; Schlegel and Eloul 1988; and Hartung 1982). Harrell and Dickey present a survey of theories and case studies of dowries from this literature.

The economics literature is more limited. First, there is a lively debate on the determinants of rising dowry values in modern India (Anderson; Edlund; and Rao).<sup>4</sup> Second, noting that in some societies, a dowry has to be returned upon failure of the marriage, Zhang and Chan (1999) shows that dowries but not bride prices affect the division of housework between Taiwanese married couples. While the point is not developed, they suggest that daughters in virilocal societies may prefer dowries because they will have difficulties in getting their share of the natal wealth otherwise. This suggestion is in the spirit of this paper.

The model is presented in section 2. Section 3 presents the evidence from early Renaissance Tuscany. The evidence from São Paulo is presented in section 4. We conclude in section 5.

## 2 A Model of Dowries

Consider a family with two children, a son and a daughter, in a virilocal society. After marriage, the son continues to live and work with his parents. After marriage, the daughter leaves her natal household and moves to her parent-in-laws household.

The parents have one unit of initial capital to allocate between their two children. Let  $x$  be the share of capital allocated to the son. This allocation to the son is unobservable by outsiders because the son lives with his parents and thus his capital is intermingled with his parents' assets.  $1 - x$  is the share of initial capital that is allocated to the daughter in the form of a dowry. Given their initial capital allocations, each child can choose to either work,  $e = 1$ , or shirk,  $e = 0$ . If a child with initial capital  $z$  chooses effort  $e$ , then his or her gross wealth is  $(1 + e)z$ . The cost of effort is  $(1 + e)z$  for the son and  $\beta(1 + e)z$  for the daughter. We assume  $\beta \geq 1$  because the son, living with his parents, has family specific skills in working with family assets and his parents can also help him in his work. The cost of effort is proportional

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<sup>4</sup>Other related literature include Rosenzweig and Wolpin (1988), Cole, Mailath and Postlewaite (1992), Bergstrom (1994), and Guner (1998).

to the amount of capital allocated because the child can do other things with his or her time.

Since the son is living with his parents, the gross wealth that he creates cannot be separated from that of his parents. His parents may give to his sister some of the gross wealth that he created in the form of a parental bequest. Because the married daughter has left home, her parents cannot expropriate and give to the son any of her gross wealth. Thus there is a fundamental asymmetry in terms of parental control over the children's gross wealth.

Given the son's initial capital  $x$  and effort  $e_s$ ,  $y_s = (1 + e_s)x$  is the *gross* wealth that he creates. Since he is living with his parents, we interpret  $y_s$  also as his parents' estate. If he does not receive the entire estate upon the death of his parents, his parents have bequeathed some of his wealth to his sister. Let  $b$  be the share of gross wealth that is retained by him as his inheritance from his parents. Then his *net* wealth is

$$w_s = b(1 + e_s)x$$

In addition to affecting his consumption, his net wealth  $w_s$  also affects who he is likely to marry and his utility from that marriage. In this paper, we will assume that there is assortative matching by wealth in the marriage market. Let  $h(w_s)$  denote the wealth of the woman whom he is able to attract. When there is positive assortative matching in marriage market equilibrium,  $h'(\cdot) > 0$ . His utility from marriage will depend on his own wealth,  $w_s$ , and the wealth of his spouse,  $h(w_s)$ . Since his spouse's wealth depends on his wealth, he values his net wealth using the indirect utility function  $U(w_s)$  where  $U(\cdot)$  is increasing and concave. Thus his utility is:

$$V(b, x, e_s) = U(b(1 + e_s)x) - x(1 + e_s)$$

His sister will get a bequest of  $(1 - b)(1 + e_s)x$  from his parents. With her dowry,  $1 - x$  and effort  $e_d$ , her *gross* wealth is  $y_d = (1 + e_d)(1 - x)$ . Her *net* wealth is

$$w_d = (1 - b)(1 + e_s)x + (1 + e_d)(1 - x)$$

The wealthiest spouse that she can attract is  $h^{-1}(w_d)$ . Her utility from marriage will depend on her own wealth,  $w_d$ , and the wealth of her spouse,  $h^{-1}(w_d)$ . For analytic convenience, let her also value her net wealth,  $w_d$ , with the same indirect utility function  $U(\cdot)$ . Her utility is:

$$v(b, x, e_d) = U((1 - b)(1 + e_s)x + (1 + e_d)(1 - x)) - \beta(1 - x)(1 + e_d)$$

Assuming that parents value the welfare of both their children, let parental utility be:

$$V(b, x, e_s) + v(b, x, e_d) \tag{1}$$

To analyze the potential conflicts between parents and their children, let

**Assumption 1**

$$\begin{aligned} (i) \quad U' &> \beta \\ (ii) \quad \frac{U'}{2} &< 1 \end{aligned}$$

In order to analyze the relevance of Assumption 1, consider allocation A where the entire initial capital is allocated to the son, the son exerts effort and the final gross wealth is divided equally between the son and the daughter. Let allocation B be where the entire initial capital is allocated to the son, he exerts no effort and the final gross output is divided equally between the children.

Inequality (i) above implies that, for any dowry and fixed bequest, the daughter will prefer to exert effort rather than not. Since the cost of effort is higher for her than her brother, for any initial capital allocation, he will also exert effort if he keeps all his final gross output. With inequality (i), parental utility is higher under allocation A rather than allocation B. That is, the welfare from effort is higher than the welfare from shirking. The parent will prefer the son to work on all the initial capital because he has a lower cost of effort and to divide the final gross wealth equally between the children. Equal division of final wealth is efficient because it equates the marginal utility of consumption between the two children.

However, the implication of inequality (ii) is that the son will prefer to shirk if he only gets half the gross wealth from his effort. That is, he will not work if he has to share equally in the bequest with his sister. Thus the second inequality shows the free riding problem between brother and sister. The parents cannot implement allocation A if the son can choose his own effort.



The objective of the parents is to maximize the welfare of their children represented by equation (1) taking into account the strategic behavior of their children.<sup>5</sup> This game has four stages. In the first stage, the parents choose to allocate capital between the children. In the second stage, the daughter chooses her effort level. The daughter chooses her effort first because (i) daughters receive their dowry upon marriage and they marry earlier than sons, and (ii) the parents may not let the son have full control over his share of capital until the parents retire. In the third stage of the game, the son chooses his effort level.<sup>6</sup> Finally, the parents choose the levels of bequests. We will solve for the subgame perfect Nash equilibrium of this game.

**Proposition 2** *Let  $\beta > 1$ . In the subgame perfect Nash equilibrium, the equilibrium choice of  $x$ ,  $x^*$ , satisfies  $\frac{1}{2} < x^* \leq \frac{2}{3}$ . Both children exert effort in equilibrium. The equilibrium choice of  $b$ ,  $b^*$ , satisfies  $\frac{1}{2} < b^* < \frac{3}{4}$ . Equilibrium parental utility is:*

$$W^*(\beta) = U(1) - 2x^* + U(1) - 2\beta(1 - x^*)$$

Proof: See appendix B. ■

Proposition 2 states that, anticipating strategic behavior by their children, the parents should allocate some of the initial capital to the daughter as a dowry. The daughter receives more than a third but less than half of the initial capital as a dowry. After the children choose their optimal effort levels, the parents will optimally choose their bequests. The son receives more than half the estate. Proposition 2 rationalizes Goody's observation that daughters receive their inheritance primarily in the form of dowries whereas sons receive theirs primarily in the form of bequests.

Although  $W^*(\beta)$  is the best the parents can achieve, this equilibrium allocation of resources by the parents is inefficient. The daughter exerts effort to increase her wealth even though it is less costly for the son to do so. Allocation A generates more utility for the parents. However, due to the strategic behavior of both parents and their children, it is not implementable. Instead under the equilibrium allocation, the parents provide the daughter

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<sup>5</sup>There is also a free riding problem between brothers. Whether free riding can explain primogeniture and the custom of cash payments to sons who join the military or church is left for future research.

<sup>6</sup>There is no pure strategy equilibrium in simultaneous effort levels for some allocations of capital. The mixed strategy equilibrium in this context is not plausible given the difference in the ages of marriage.

with a sufficiently large dowry such that they will not want to redistribute too much wealth away from their son *after* he exerts effort. Under this circumstance, both the son and the daughter will provide effort.

Proposition 2 also implies that final net wealth of both the daughter and the son are the same. This implication is due to our assumption, for analytic convenience, that the indirect utility functions for net wealth are the same for both children. In general, if children have different indirect utility functions for net wealth, equality of net wealth does not follow.

In the special case where  $\beta = 1$ , where there is no difference in the cost of effort between the son and the daughter,

**Corollary 3** *Let  $\beta = 1$ . The efficient outcome can be implemented by setting  $x^* = \frac{1}{2}$  and  $b^* = 1$ .*

$$W^*(1) = U(1) - 1 + U(1) - 1$$

Proof: See corollary 8 in appendix B. ■

When there is no difference in the costs of effort between the son and the daughter, the parents give half the initial capital to the daughter as a dowry and assign the entire bequest to their son. Daughters are effectively disinherited even though parents care about their daughters and they can give bequests to their daughters if they want to.

In other dotal societies, by custom and/or law, parents are restricted from granting bequests to their daughters. Then all parents can do to affect their children's welfare is the initial division of capital. Due to Assumption 1(i), both children will exert effort if they get to keep all their gross wealth. Thus the parents solve:

$$\widetilde{W}(\beta) = \max_x U(2x) - 2x + U(2(1-x)) - 2\beta(1-x) \quad (2)$$

The optimal choice of  $x$ ,  $\tilde{x}$ , satisfies:

$$U'(2\tilde{x}) = U'(2(1-\tilde{x})) - (\beta - 1) \quad (3)$$

which implies that  $\tilde{x} > \frac{1}{2}$ . Parents allocate more capital to their son and therefore the final wealth of the son is higher than that of the daughter. This asymmetry is due to the fact that it is less costly for the son to work with that capital than his sister. Depending on parameter values,

**Proposition 4** *A custom and/or legal restriction disinheriting daughters may increase parental welfare.*

Proof: See appendix B. ■

The tradeoffs behind Proposition 4 are as follows. Without disinheriting daughters, parents can equate wealth across their children. As  $\beta$  increases, the efficiency cost of dowry increases and parents prefer to give smaller dowries. However, there is a minimum dowry size below which the son will shirk. If daughters are disinherited, parents do not worry about a minimum dowry size but have to deal with the inequality of wealth between their children instead.

We may summarize the above discussion as follows. Since bequests are chosen after children choose their effort levels, the children recognize that altruistic parents may use bequests to redistribute wealth among the children. Anticipating this redistribution, the children may free ride on each other's effort. To deter this free riding, parents will provide dowries to daughters even though daughters are less efficient in using the capital than sons. Bequests to daughters will be smaller than that for sons. Daughters may even be disinherited. However, in general, the level of bequest to a daughter is not informative about parental valuations of their daughter and their son.

## 2.1 No Income Sharing in Dowry Contracts

When dowries are used to provide incentives for sons to work, it is important that the dowry contracts do not unravel the incentive effect. Since families may be liquidity constrained and parents worry about the treatment of their married daughter by the in-laws, a dowry contract may be complicated. It may contain deferred payments and state contingent payments. The contract may also contain clauses as to the disposition of the dowry when and how the couple separates. However, if our explanation is correct, a dowry contract should minimize the sharing of profits generated with the family assets after she leaves her natal household. A profit sharing arrangement will dissipate the work effort of her brother. So a married daughter may not only get a smaller share, if any, of her parent's bequests as observed by Goody. She may also not receive inter vivos shares of revenues generated from the family's assets.

## 2.2 Family Demographics and Dowry Values

Anticipated bequests play an important role in our model. In evaluating the wealth contribution of potential spouses, an individual has to forecast the bequests that potential spouses are likely to receive. If a woman in the marriage market has few brothers, her family will be less worried about the free riding problem. There is less need to use dowries to solve the incentive problem. Holding family size constant, there will be a positive correlation between the dowry she gets and the number of her brothers. If parents are liquidity constrained, the need to raise multiple dowries for multiple daughters may also lead to parents with more daughters giving smaller dowries. A parental preference for sons' consumption will act in the opposite direction.

The number of brothers that a groom has also affects the dowry that he receives. If brothers compete for parental resources, then a groom will receive a smaller dowry if he has more brothers. On the other hand, there may be increasing returns to household wealth creation with sons. In this case, a groom will receive a larger dowry if he has more brothers.

## 2.3 Wither Dowries?

A theory of dowries has to explain its disappearance in previously dotal societies. We now discuss the decline of dowries within our framework. As the labor market in a society becomes more developed, as the demand for different types of workers grow, children are less likely to work in the same occupation as their parents. They are also less likely to work for their families. The use of bequests to align work incentives within the family become less important. As the labor market develops, the value of human capital investments also rises. Since it is costly to pay a dowry, the demand for dowry within the family will fall as the need to use bequests to align the work incentives of sons fall. Instead of the dowry, parents will transfer wealth to both their daughters and sons as human capital investments and bequests. Therefore, the development of labor markets will be important in reducing the role of dowries.

Moreover, as the labor market develops and sons work outside the family business, the gains from living in an extended family become smaller. Instead of virilocal households, sons are also more likely to set up their own, neolocal, households when they marry. Again, the use of bequests for sons to align their work incentives decreases. Thus the role of dowries as a mechanism to

mitigate the free riding problem among married children also declines. The transition from a virilocal society to a neolocal society should coincide with the demise of dowries in that society.

### 3 Evidence from Early Renaissance Tuscany

The above model provides an environment which rationalizes Goody's observation that in a dotal society, parents transfer their wealth to daughters primarily through dowries. We present evidence to test our theory of dowries by using data from an economy, such as medieval and Renaissance Tuscany, in which dowries figured prominently.<sup>7</sup>

Two institutional features characterize medieval and Renaissance Tuscany. First, partible inheritance with sons inheriting equal shares of the family wealth was the norm; evidence from last wills confirms that parents left equal shares of their estates to their male children (Botticini 2000b). Second, a woman could not marry without a dowry. The dowry could consist of cash, real property, and movable property. Husbands could use, invest, and manage their wives' dowries, but they had to return the dowry in its entirety if the marriage dissolved. They could not freely sell or give away land belonging to their wives' dowries without the consent of their wives or their guardians. Brides (or their families) could sue husbands who mismanaged or failed to return the dowry at the marriage's termination. If the husband predeceased his wife, his heirs had to be able to return the dowry to the widow who could decide to go back to, and live with, her natal family, remarry, or live on her own.

To study *(i)* whether dowries disinherited daughters, *(ii)* whether dowry contracts contained no income sharing clauses, and *(iii)* to assess the effect of family demographics on dowry values, we use data from manuscripts housed at the State Archives of Florence. Marriage contracts written by notaries provided information on the size of the dowry, its composition, terms of payments, the names of the bride, the groom, and their respective fathers, and

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<sup>7</sup>Using the Florentine catasto of 1427, Herlihy and Klapisch (1978) provides a socio-economic portrait of late medieval Tuscany. For references on medieval and Renaissance marriage markets in Italy and the economic role of women, see Brown and Goodman (1980), Chabot (1990), Chojnacki (1975, 1990, 1991), Cohn (1996), Gregory (1987), Hughes, Kirshner (1985, 1991), Kirshner and Molho (1978), Klapisch-Zuber, Kuehn (1980, 1991), Molho (1994), Queller and Madden (1993), and Riemer (1985).

the place of residence. The deeds record marriages in the Tuscan town of Cortona and forty-four villages in its countryside between 1415 and 1436. At that time, Cortona was the sixth most populous town in the Florentine territories. We then matched these brides's and grooms' households recorded in the marriage contracts with the corresponding households in the Florentine *catasto* of 1427, which supplied information on the wealth, occupation, number of children and percentage of sons (or daughters) living in the bride's and groom's households, and ages of the spouses (and their parents').<sup>8</sup> Out of 328 marriage contracts, 222 couples could be matched to their paternal households in the contemporary census.<sup>9</sup> Dowry values in the matched sample were marginally larger (Table 3 in the next section).

[INSERT TABLE 1]

Table 1 shows that both the distribution of dowries and household wealth are right skewed. The median dowry in the matched sample was 70 florins, more than a third of the median parental household wealth. Since the average annual labor earnings of a male worker in Florence in 1427 was 14 florins (Herlihy and Klapish-Zuber), the median dowry in Cortona amounted to five years of a typical worker's labor earnings.

In Cortona, as well as in other Tuscan towns at this time, a ten-year gap existed between the age of the bride and the age of the groom. On average, women married in their late teens and men in their late twenties. The age difference creates some artificially measured differences between brides' and grooms' families. First, consider the date at marriage. As the average age of grooms and brides also represent the average age of children in their respective parental households, the grooms' siblings were more likely to be married than the brides' siblings. Since women married earlier than men,

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<sup>8</sup>The Florentine *Catasto* of 1427 is a census and property survey of 60,000 households living in the Florentine territories. In that year the government of Florence, pressed by urgent financial needs due to continuous warfare with other Italian cities, tried to increase its tax revenues. To ascertain the wealth of the citizens living in all its domains, Florence undertook the *Catasto* a comprehensive census and property survey. Each household head had to declare the houses, lands, and draft animals he owned; the crops grown, and types of agrarian contracts used; the average crop yields of the previous three years; his debts and credits; his shares of commercial partnerships; and his occupation. Furthermore, he had to report the composition of his family by name, age, sex, and relationship to himself.

<sup>9</sup>These 328 notarial deeds are a complete enumeration of all surviving marriage contracts for Cortona and its countryside between 1415 and 1436. 292 of these contracts state the value of the dowry.

the grooms' sisters were more likely to have married and left their parental households. This undercounting of siblings and sisters shows up in Table 1 where the grooms' families have, on average, one less sibling and there are relatively more sons. Second, the median wealth of the grooms' households is 35 florins lower than that of the brides' households. This difference reflects the difference in dowries paid and received between the two types of households.<sup>10</sup>

### 3.1 A Virilocal Society: Cortona, 1415–1436

A necessary condition for our model of dowries is that the society is virilocal. Medieval and early Renaissance Tuscany, including Cortona, was a virilocal society. A tiny percentage of grooms lived in their brides' households, while almost all the brides left their paternal households after the marriage. This coresidency pattern was typical of all Tuscan towns in this period: in Florence, in 1427, only two grooms out of 9,780 households coresided with their brides' households (Herlihy and Klapisch 1978, 651). Seventy-four percent of Tuscan men, either single or married, coresided with their paternal households. In the *town* of Cortona, out of 898 households, 0.33 percent of grooms coresided with their brides' households and in its *countryside*, out of 1121 couples, 1.07 percent of grooms did so.<sup>11</sup> In the Cortona matched sample, 81.2 percent of the 167 couples who married before 1427 lived in the grooms' paternal households (Table 2). The remaining 18.8 percent of couples who did not coreside with the grooms' households did so because both parents of the groom had died and the groom had no siblings.<sup>12</sup>

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<sup>10</sup>The data has another potential measurement problem. Household wealth and demographic data come from the *catasto*, which was collected at a point in time, 1427. Dowry data came from marriages that occurred on either side of 1427. For marriages that occurred after 1427, given that children lived at home until they married, the brides and grooms would be included in their paternal households in the *catasto*. Meanwhile, for marriages that occurred before 1427, if the married couple moved in with the groom's family (as was almost always the case), the groom would be included in his paternal household in the *catasto*. His bride, however, would not be recorded as part of her paternal household. In general, daughters are systematically undercounted in the sample if they married away before being surveyed in the *catasto*. We deal with this problem by adding back the married daughter to the bride household and by including in the regressions a post-1427 dummy variable as well as its interactions with relevant demographic variables.

<sup>11</sup>ASF, *Catasto* 213, 214, 215, 216, 252, 253.

<sup>12</sup>In two cases, although the groom's widowed mother and his siblings were still alive, the couple did not coreside with them. In one case, in 1429, 22-year old messer Giovansimone,

[INSERT TABLE 2]

Besides primarily living with their paternal households, seventy-five percent of grooms in the Cortona matched sample had the same occupation as their fathers. In the countryside, the continuity between a father's occupation and his sons' occupation was the rule. In the town of Cortona, some grooms practiced a different profession than their fathers, but these were the exceptions.

### 3.2 Do Dowries Disinherit Daughters? Evidence from Dowry Contracts and Wills

Historians have maintained that since dowries disinherit women, they bring an unequal distribution of family wealth among female and male siblings (Cohn; Hughes; and Klapisch-Zuber). However, they have not presented systematic evidence to substantiate such a claim.

Proposition 2 and corollary 3 show parents may or may not give bequests to their daughters. In either case, their daughter and son consume, as a first approximation, an equal share of the family wealth; the difference is that daughters receive most of this wealth through dowries, while sons receive most of it through bequests. Proposition 4 show that under some circumstances daughters may get neither a bequest nor an equal share of the family wealth. Thus which regime applies is an empirical issue.

The evidence from Tuscany indicates that the existence of dowries, by itself, did not prevent daughters from receiving roughly an equal, or even higher, share of the paternal family's wealth. First, in our sample of marriage contracts for Cortona the median dowry (70 florins) was larger than the median share of family wealth per child—159 florins divided by 3 children (Table 1).<sup>13</sup> Even if parents did not leave any bequests to their daughters in Cortona, this data suggest that daughters and sons received similar shares of the family wealth despite the fact that daughters received dowries.<sup>14</sup>

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son of the late Andrea degli Alfieri, married 14-year old Elisabetta, daughter of the wool merchant Bartolomeo, son of Senso. Giovansimone set up his neolocal household with his bride and did not live in the paternal household together with his widowed mother and his three siblings (ASF, Notarile Antecosimiano 18914, fols. 93v-94r).

<sup>13</sup>This calculation assigns a wealth of zero to the parents.

<sup>14</sup>We are currently collecting data on wills in Cortona for the same period to see whether parents left any bequests to their daughters.



Second, evidence from wills in Florence between 1430 and 1435 for which we matched the testator in the Florentine catasto of 1427 indicates that in very few instances parents transmitted their wealth to daughters via bequests instead of dowries. In a sample of 187 last wills written in Florence from 1430 to 1435 only 27 testators (14.4 percent) left bequests to daughters; in 20 of these 27 cases the testator had no sons.<sup>15</sup> In 7 cases (3.7 percent) the testators who had sons left bequests to their daughters. In those instances in which they did, the size of the bequest left to a daughter was very small with respect to the dowry she got at the time of her marriage. Since daughters could and in some instances did receive bequests, proposition 2 did not apply. Proposition 1 and corollary 1 apply and predict that sons and daughters, as a first approximation, received the same amount of family wealth. In a small sample of 84 matched dowry contracts between 1420 and 1435, the median dowry in Florence was 700 florins and the median share of family wealth per child was 650 florins.<sup>16</sup> This finding is at odds with those historians who claimed that Florence was the “worst” place to be a woman (and a daughter) in the Renaissance (Cohn).

Although it does not apply to early Renaissance Cortona and Florence, Proposition 4 indicates that laws explicitly prohibiting parents from leaving bequests to their daughters may increase parental welfare. In some cities in medieval Europe, laws and statutes excluded daughters from bequests and allowed them to inherit from their parents only through dowries. For example, in southern France and in Catalonia, starting from the middle of the eleventh century statutes and codes contained the same provision: dowered daughters were excluded from future rights in their paternal estate and the dowry became the only portion of the paternal wealth over which a daughter retained legitimate claim.

### 3.3 No Income Sharing in Dowry Contracts

As discussed in section 2.1, while potentially complicated, dowry contracts should not contain any income sharing provision. Dowry contracts did not

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<sup>15</sup>See Botticini (2000b).

<sup>16</sup>We have collected roughly 2,960 marriage contracts for Florence and its countryside between 1420 and 1435, and we are currently matching the data with the Florentine catasto of 1427. This sample of 84 matched dowry contracts is biased toward wealthy households. See Botticini (2000a) for a detailed analysis of the trend in dowry values in Florence from 1250 to 1450.

have income sharing clauses in medieval and early Renaissance Cortona. Table 3 classifies the sample of 222 matched marriage contracts and all 328 marriage contracts according to (i) the type of goods forming the dowry (cash, houses, shops, land holdings, and movable objects such as clothes, linen, and furniture), and (ii) the terms of payments.

[INSERT TABLE 3]

More than half of the Cortona matched contracts had clauses entailing deferred payments. A typical specification was the bride's household promising to pay one-third of the dowry after the first year of the marriage, one-third after two years, and the remaining one-third after five years. Deferred payments were the most common clause in the contracts. There are three reasons for their popularity. First, the bride's parents may be liquidity constrained. Second, consistent with Zhang and Chan, the deferred payments provided incentive for the groom's family not to mistreat their daughter-in-law. Third, the bride's family could avoid making all the payments if she died during child birth. Independent of the free riding problem, the dowry contract also addressed other concerns of the interested parties.

The majority of contingent payments were contingent upon the groom's request. That is, the contract explicitly provided that a portion of the dowry was to be paid "when the groom will ask for it." For example, in 1421, 22-year old Benedetto, son of the wool merchant Antonio, married 14-year old Giovanna, daughter of the wool merchant Bernardino. The dowry was 400 gold florins and had to be paid in the following way: 100 florins at the groom's father's request, 100 florins within one year, 100 florins within two years, and the remaining 100 florins within three years.<sup>17</sup>

These complex marriage arrangements were not exclusively chosen by wealthy and/or prominent urban households. Rural and peasant households

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<sup>17</sup>ASF, Notarile Antecosimiano 18910, fols. 205v-206r.

In a few other instances, the payment of the dowry was made contingent upon the death of the bride's mother or of some other relatives (like an aunt or a grandmother). The size of, and timing of payment of, the dowry were sometimes made contingent upon the decision of third parties (either friends or prominent people in Cortona). For example, in 1422, 20-year old Giovanni, son of the shoemaker Cristofano, married 13-year old Pagola, daughter of the late wool merchant Benedetto. The dowry was 200 gold florins and the timing of the payment was left to be decided by an arbitrator (ASF, Notarile Antecosimiano 18910, fols. 315r-315v).

also agreed to complex marriage arrangements.<sup>18</sup>

The features of the dowry contracts in early Renaissance Cortona provide support to the argument that dowries solve a free riding problem. Only two out of 328 marriage contracts contained a clause involving a profit sharing arrangement.<sup>19</sup> For example, in 1415, 31-year old Paolo, son of Uccio, who lived in the countryside of Cortona, married 26-year old Antonia, daughter of Meo, who lived in the town of Cortona. The dowry (80 florins) was to be paid according to the following terms: a house in Cortona, whose value was to be estimated by third parties, within a month, and the remaining amount in cash within three years. Moreover, the groom's father was entitled to the revenue from two land plots, which grew wheat, in the countryside of Cortona. The rarity of income sharing clauses was not due to the lack of knowledge of share contracts. In both trade and in agriculture, share contracts were well known in medieval and early Renaissance Tuscany. For example, Tuscan landlords and peasants often used share contracts in agriculture.<sup>20</sup> However, in the context of dowries, income sharing agreements were rare.

### 3.4 Dowries and Family Demographics

Economists have estimated dowry value regressions where dowry values are regressed on bride's and groom's characteristics (Anderson; Botticini; Edlund 1997; Rao). We will show that it is straightforward to interpret the estimates of an ordinary least squares (OLS) regression of dowry values on bride's characteristics alone. The interpretations of the estimates of a regression of dowry values on groom's or bride's and groom's characteristics are more problematic.

Let  $W^f$  be the wealth of the bride and  $W^m$  be the wealth of the groom.

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<sup>18</sup>For example, in 1423, 26-year old Pietro, son of the late Martino, married Agnola, daughter of Biagio. Both the groom's and the bride's households were peasant households living in the countryside of Cortona. Their marriage contract specified that the dowry amounted to 60 florins and had to be paid according to the following schedule: 15 florins when the bride went and lived in the groom's household after the marriage, 15 florins within one year from that event, 15 florins within two years, and the remaining 15 florins within three years (ASF, Notarile Antecosimiano 18911, fol. 28r).

<sup>19</sup>The two contracts, which allowed for a profit sharing arrangement, are in ASF, Notarile Antecosimiano 18908, unnumbered fol., and 18910, fols. 390r.

<sup>20</sup>See Akerberg and Botticini (1999), Emigh (1997), Galassi, Mealli and Pudney (1998), Herlihy and Klapish-Zuber, and Luporini and Parigi (1996).

$W^f$  may be decomposed into dowry wealth,  $D$ , and non-dowry wealth,  $N$ :

$$W^f = D + N$$

Non-dowry wealth,  $N$ , consisted of investments in human capital, bequests, and post marital intervivos transfers. Consider the linear projection of dowry value on a vector of bride's characteristics,  $X_f'$ :

$$D = X_f' \alpha_f + u_{D_f} \tag{4}$$

Our theory puts restrictions on  $\alpha_f$ . In our regressions, there are three characteristics of interest. First, *ceteris paribus*, assuming that daughter's wealth is a normal good, the wealth of the bride's household and other wealth proxies should have a positive impact on the value of the dowry. Second, the number of children should be negatively related to the value of the dowry.

Third, the number of sons *may* be positively related to the value of the dowry. A positive effect may occur because an increase in the number of sons may make daughters less likely to get much of the parents' bequest. Anticipating this smaller bequest, a groom wanted a larger dowry. Some historians argue that, in medieval dotal societies, parents transferred more wealth to their sons than to their daughters (Hughes 1975; Klapisch-Zuber 1985). A naive application of this argument implies that the dowry should fall when the fraction of sons in a family increases. Our model suggests that the dowry may rise if daughters are concerned about being excluded from parental bequests. The number of sons may also be positively related to the value of the dowry if parents are liquidity constrained. Parents who had more daughters to marry off, gave more but smaller dowries. Finally, the number of sons may also be positively related to the value of the dowry if more sons created more household wealth and some of this increase in household wealth spilled over to their sisters in the form of larger dowries. These predictions can be tested by estimating (4) by ordinary least squares with cross section data on dowry values and brides' characteristics.

What are the properties of a cross section regression of dowry values on the grooms' characteristics?

In a marriage market with assortative matching by wealth of brides and grooms, bride's wealth and groom's wealth will be positively correlated. We do not have data on brides' or grooms' wealth, but there is data on parental wealth. Since we expect a positive correlation between parental wealth and

their children's wealth, we can check the extent of assortative matching by wealth levels of the parents. The correlation between log of the bride's parents' wealth and log of the groom's parents' wealth is 0.68. This correlation provides unambiguous evidence of assortative matching by wealth in marriage.

Assuming a linear wealth matching function  $W^f = a + hW^m$ ,  $h > 0$ , we can relate the bride's optimal wealth to her husband's optimal wealth:

$$W^f = a + hW^m \quad (5)$$

$$D + N = a + hW^m \quad (6)$$

Using (6), the dowry,  $D$ , may be expressed as:

$$D = -N + a + hW^m \quad (7)$$

Consider the linear projection of groom's wealth on a vector of his characteristics,  $X_m'$ :

$$W^m = X_m' \alpha_m + u_{W_m} \quad (8)$$

Assume that the theory implies that  $\alpha_m > 0$ . Again there are three characteristics of interest. Ceteris paribus, a wealthier groom household should lead higher groom's wealth. Second, a decrease in the number of children should increase groom's wealth. Third, an increase in the number of sons should increase groom's wealth if sons increased wealth for the family. On the other hand, if sons did not increase family wealth, there may be no or a negative effect of the number of sons on groom's wealth.

Now substitute (8) into (7) to get:

$$D = X_m' h \alpha_m + v \quad (9)$$

$$v = -N + a + h u_{W_m}$$

The theory implies:

$$h \alpha_m > 0$$

Estimating (9) by OLS is not straightforward. The difficulty is due to the correlation between  $v$  and the regressors in (9). In general, non-dowry

wealth,  $N$ , will be positively correlated with groom’s wealth and therefore the groom’s characteristics. So  $v$  is likely to be negatively correlated with  $X_m$  which will induce a downward bias to the estimate of  $h\alpha_m$ . Due to these biases, the OLS estimates of (9) are difficult to interpret. As shown in our earlier draft (Botticini and Siow (1999)), the inability to produce consistent estimates of  $h\alpha_m$  remains if we regress dowry values on both bride’s and groom’s characteristics.<sup>21</sup>

### 3.5 Dowry Value Regressions

Tables 4 and 5 present OLS estimates of dowry value regressions. Each regression has 222 observations. The estimated intercept and fixed effects for siblings are suppressed.<sup>22</sup> Exact definitions of the variables are given in Appendix C.

[INSERT TABLE 4]

Table 4 presents results with bride characteristics alone which corresponds to equation (4). In column 1, the dependent variable is the nominal value of the dowry. We have three proxies for wealth. Dowry value increased at a decreasing rate as household wealth increased. It also increased if her parents lived in the town rather than in the countryside but not if the father’s occupation was non-agricultural. An additional sibling decreased her dowry by a statistically significant 15.13 florins. An additional brother increased her dowry by a statistically significant 18.61 florins. Our explanation for this positive estimated coefficient is that her husband demanded a higher dowry in anticipation of a smaller bequest. Moreover, households might have been liquidity constrained and therefore gave smaller dowries when they had more daughters to marry off. Finally, if household wealth was increasing in the number of sons, some of the wealth spilled over to the daughters. Later, we shall provide evidence that casts some doubt on the spillover hypothesis.

Since nominal dowry values are not normally distributed, column 2 provides median regression estimates of equation (4). The estimated coefficients

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<sup>21</sup>The general difficulty of interpreting OLS hedonic regressions is well known (Akerberg and Botticini; Bartik 1987; Brandt and Hosios 1996; Epple 1987; Kahn and Lang 1988, Rosen 1974).

<sup>22</sup>We also ran regressions without sibling fixed effects which correspond to those in Tables 4 and 5. There is little difference in the estimates.

from the median regression are of the same quantitative magnitude as the OLS estimates. However, they are less precisely estimated. An additional son still caused the dowry value to rise by 5.920 florins but it is imprecisely estimated.

Column 3 presents a log linear version of (4). The elasticity of dowry with respect to bride’s household wealth is precisely estimated at 0.3185. The estimated coefficient on the urban dummy is positive and statistically significant. The estimated coefficient on the father in a non-agricultural occupation is positive but not precisely estimated. An additional child reduced her dowry by a statistically significant 7.81 percent. An additional brother increased her dowry by 5.84 percent and the estimated coefficient is marginally significant.

We have also run regressions using a dummy variable which takes on a value of one if there was no son in the family ( $\simeq 30$  percent of families) rather than using the number of sons. The estimated coefficients on this dummy variable were always negative and less precisely estimated than when using the number of sons. So the number of sons have additional explanatory power compared with the no son dummy variable.

In summary, the results in Table 4 are consistent with the model considered in this paper. The estimated signs of all the important variables are the same whether we use the nominal value or the log of the nominal value of the dowry, whether we estimate equation (4) by OLS or median regression.

[INSERT TABLE 5]

Table 5 presents dowry value regressions on groom’s characteristics.<sup>23</sup> The first observation is that the fit of the regressions in all three specifications is worse than for the corresponding regressions with bride’s characteristics. An explanation for this poorer fit is that our theory leads to a direct specification of the dowry value regression with bride’s characteristics (equation 4). On the other hand, our theory provides a theory of the determination of groom’s wealth (equation 8), but groom’s wealth is not observed. Instead we use dowry value as a proxy for groom’s wealth as in equation (9) with its associated bias against the null hypothesis. Moreover, we tend to underestimate the number of children in the groom’s household since many of his sisters would have been married and left the household. There is no simple prediction for the bias due to this underestimation.

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<sup>23</sup>The median regression does not contain sibling fixed effects because the standard errors did not converge.

The evidence in Table 5 suggests that wealthier groom households obtained larger dowries. The effects of the number of children and the number of sons in the groom's household are imprecisely determined. As discussed earlier, it is difficult to estimate the true impact of groom's characteristics on dowry value.<sup>24</sup> Still, there is no particular evidence supporting the hypothesis that more sons significantly increased household wealth or that brides' households gave significantly larger dowries to marry into groom's households with more sons.

As a crude adjustment for the measurement errors induced by the fact that some marriages occurred before 1427 and some occurred afterwards, we experimented with interaction terms with the post 1427 dummy variable for both bride's and groom's attribute regressions. Other than losing precision in our estimates, we did not find any systematic effect.

Taken together, the estimates in Table 4 and 5 suggest that there is evidence in favor of the hypothesis that grooms obtained larger dowries when there were more sons in the brides' households. These larger dowries can be rationalized by our theory that grooms who married brides with more brothers anticipated that their wives would receive smaller future transfers. As a result, the parents of these brides had to provide larger compensating dowries. The larger dowries may also be due to the fact that these parents were less liquidity constrained.

## 4 The Decline of Dowries in São Paulo

Currently, we do not have data on the decline of dowries in Tuscany. In general, there is little data on the decline of dowries in a society due to the large time span of historical data needed to track its decline. An exception is Nazzari (1991) who studied the evolution of dowries in São Paulo, a coastal community in Brazil, from 1600 to 1900. She analyzed probate records of wealthy, propertied, Paulistas. In the period under study, all children were legally entitled to equal shares of the estate of the deceased parent. A daughter who had a dowry had the option of "returning" the dowry to the estate and asking for her share of the reconstituted estate. Thus probate records explicitly or implicitly (when daughters did not share in the estate) accounted for dowries paid.

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<sup>24</sup>In our earlier draft (Botticini and Siow 1999), we also ran dowry value regressions with both bride's and groom's characteristics together. Those results were not more informative.



In the seventeenth century, most daughters of property owners received a dowry at marriage. In the middle of the eighteenth century, 9 percent of property owners allowed their daughters to marry without a dowry. In the nineteenth century, three quarters of property owners allowed their daughters to marry without a dowry. The value of the dowries also fell through the centuries. While few daughters in her sample “returned” their dowries to their parents’ estates in the seventeenth century, more daughters did so in the eighteenth century and they all did in the nineteenth century. Thus, the relative value of dowries fell over time even for those daughters that received dowries.

In the seventeenth century, wealthy Paulistas derived most of their wealth from agriculture. Most married sons lived with, and worked for, their parents. Gold was discovered in the interior of Brazil in the eighteenth century. According to Nazzari (1991, 165),

The great patriarchal power over adult offspring that was the rule in seventeenth-century São Paulo gradually diminished. In the eighteenth century sons migrated, transported mules and oxen to the mines, or plied long-distance trade, making it more difficult for their fathers to control them. With the growth of individualism in the nineteenth century, sons became even more independent of their fathers in their business lives, and both sons and daughters were acquiring freedom in the selection of a marriage partner. Such freedom was itself a consequence of the decline of the practice of dowry.

While her theory of dowries is different from ours, Nazzari’s selection of the economic forces that led to the decline of dowries in São Paulo is consistent with our theory.

The equal inheritance law for children mitigated the work efforts of sons. It is suggestive that in the seventeenth century, when dowries were most prevalent, daughters usually received dowries that were larger than the bequests of their brothers. Daughters seldom “returned” their dowries. In the eighteenth century, dowries became less prevalent and the relative value of dowries also fell. More and more daughters “returned” their dowries. Nazzari documented numerous disputes between the siblings when daughters tried to “return” their dowries. Consistent with our model, by the time (nineteenth century) most daughters chose to “return” their dowries, the use of bequests to align work incentives within the family was largely irrelevant.

## 5 Concluding Remarks

This paper argues that altruistic parents transfer wealth to their children. In virilocal societies, parents use dowries for daughters and bequests for sons to efficiently transfer wealth to their married children. When the factors that support a virilocal society decline, the justification for dowries also decline. Thus our case for dowries is based on efficient parental transfers to their married children and not with marriage market clearing per se. A broader objective of this paper is to shift research focus from the marriage market clearing role of dowries to other roles while simultaneously respecting marriage market equilibrium.<sup>25</sup>

The normative implication of our paper on the value of daughters and the role of women in dotal societies is different from the standard views. The standard spot market interpretation of dowries, where parents pay dowries for their daughters to marry, suggests an asymmetric equilibrium value of daughters relative to sons in marriage. Observers of dotal societies often argue that dowries are used to disinherit daughters to their disadvantage (Hughes, Klapisch-Zuber). Our model shows that such judgements are premature. Our model is nested within an equilibrium marriage market framework. Yet the existence of dowries per se does not imply that dotal societies value daughters or women less than non-dotal societies. Within a dotal society, the value of a dowry is not a sufficient statistic for the equilibrium value of the new daughter-in-law. Even the disinheritance of daughters in dotal societies is not by itself informative on the relative values of daughters compared with sons.

Finally, as discussed in the introduction, the amounts of inter vivos transfers from parents to married children in virilocal societies may be difficult to measure. Inter vivos transfers to married sons may be larger than dowries and parental bequests of their own wealth to sons may be relatively small, and yet researchers may “observe” the opposite.

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<sup>25</sup>Zhang and Chan is a pioneer in this direction. Klapisch-Zuber expressed strong reservations about the relevance of the spot market role of dowries in medieval Tuscany. Her chapter 10 can be read as a rejection of the value of the dowry as a sufficient statistic for the value of a daughter in the marriage market.

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## A The Historical Development of the Dowry: Laws, Customs, and Institutions

While a central feature of marriage customs in both ancient Greece and in the Roman empire, the institution of the dowry as a wealth transfer from parents to their daughters seems to have disappeared or at least lost importance with the fall of the Roman empire.<sup>26</sup> The dowry resurfaced in Italy, southern France, and Catalonia around the eleventh century at the time in which Europe was witnessing demographic growth, the rebirth of cities, and the Commercial Revolution. By the thirteenth century, the dowry was the main marriage “payment” given that the counterdower offered by the groom to the bride at the time of the marriage had become a negligible sum of money with almost no relation with the size of the dowry. It is worthwhile to highlight that at the same time when in Europe the dowry was reemerging as the major wealth transfer at marriage, in Sung China (eleventh century) dowry payments grew in importance with respect to the betrothal gifts conveyed by the groom’s family (Ebrey 1993, 101).

Unlike in Roman law, in which the dowry was not considered a form of female inheritance, its reappearance in Europe during the early Middle Ages coincided with its association and almost identification with female inheritance. According to Hughes (1978, 32–35), dowries became more and more a way of disinheriting daughters by excluding them from subsequent claims to their paternal family’s wealth. In many medieval cities and communes, statutes and codes explicitly stated that the dowry was a substitute for a daughter’s claim on her paternal family’s estate. In Pisa in the 1140s, a *constitutum usus* established that dowered daughters were denied further rights in their paternal inheritance. A similar principle became a common feature of many statutes in northern Italy.<sup>27</sup> In southern France and in Catalonia, starting from the middle of the eleventh century statutes and codes contained the same provision: dowered daughters were excluded from future rights in their paternal estate and the dowry became the only portion of the paternal wealth over which a daughter retained legitimate claim. This legal context differs from Sung China in which dowries were considered a share of the fam-

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<sup>26</sup>This section draws heavily on Hughes’ (1978) insightful work on the historical development of marriage payments and dowries in Europe from the Graeco-Roman world up to the Middle Ages.

<sup>27</sup>Bellomo (1961), Pertile (1966).

ily property but daughters were not excluded from receiving bequests (Ebrey, 107).

The dowry could consist of cash, real property, and movable property. The increasing monetization of the dowry, which more and more consisted of cash instead of real property, has been viewed by Hughes (1978, 34) as further evidence that daughters were disinherited through the provision of dowries. In Genoa in the thirteenth and fourteenth centuries, for example, seventy percent of the dowries recorded in notarial records consisted of cash. The same occurred in thirteenth-century Siena, and in medieval southern France. Not only medieval statutes and codes were denying daughters further rights to paternal inheritance, but, according to Hughes the payment of dowries in cash exacerbated daughters' exclusion from sharing in the real property belonging to their paternal estates.

Two important legal features of the dowry pertained to (i) who retained ownership and control over it during the marriage, and (ii) what happened at the marriage dissolution. In medieval Italy brides retained legal ownership over their dowries. Husbands could use, invest, and manage their wives' dowries, but they had to return the dowry in its entirety if the marriage dissolved. Husbands could not freely sell or give away land belonging to their wives' dowries without the consent of their wives or their guardians. Brides (or their families) could sue husbands who mismanaged or failed to return the dowry at the marriage's termination. The dowry was usually divided into two portions: the appraised goods (*res estimata*) and the unappraised goods (*res inestimata*). In the former case, the husband (or his heirs) had to give its assessed worth back to the wife (or her heirs) at the marriage's dissolution. In the latter case, the husband had to return the property received intact. In modern Greece women retained control over the land holdings brought as dowry into marriage. Unlike in Italy, in early modern England husbands gained full control over the cash, furniture, and other movables of the dowry. In Sung China the property brought as dowry into marriage was not merged with the groom's family's estate and was not subject to division at the time the estate was distributed among the heirs. Wives, however, could not sue their husbands if these used their dowries against their wives' wishes (Ebrey, 107). In contemporary northwest India the groom's family can assign part of the dowry to other family members as they wish.

By the 1250s in southern Europe, women had secured their rights over their dowries in the event that their husbands predeceased them. If the husband predeceased his wife, his heirs had to be able to return the dowry

to the widow who could decide to go back to, and live with, her natal family, remarry, or live on her own. In China, women's legal rights over their dowries in the event of their husbands' death changed from the Sung to the Yüan and Ming dynasties. During the Sung dynasty, wives were returned their dowries if their husbands predeceased them, while in the Yüan and Ming periods women could not take their dowries if they returned to their natal families or remarried (Ebrey, 113).

When the wife predeceased his husband, the law varied from place to place. In many Italian communes, statutes and codes established that the dowry had to be restored to her parents (if alive) or to her children (Bellomo, chapter 6). In other cities, such as Genoa and Pavia, husbands were entitled to have back what they had contributed as counterdower. In some cities in France, husbands retained usufruct of any real property belonging to the dowry (Hughes, 37). In Sung China, the dowry passed to the husband or children, unless the woman had decided in a different way (Ebrey, 109).

## B Proof

In the final stage of the game, given final gross wealth of the son,  $y_s = (1 + e_s)x$ , and final gross wealth of the daughter,  $y_d = (1 + e_d)(1 - x)$ , the parents will choose the optimal share of bequest  $b^*(e_s, e_d, x)$  such that:

$$\begin{aligned} U'(b^*(1 + e_s)x) &= U'((1 - b^*)(1 + e_s)x + (1 + e_d)(1 - x)) \\ \implies b^*(1 + e_s)x &= (1 - b^*)(1 + e_s)x + (1 + e_d)(1 - x) \quad \text{if } y_s > y_d \\ &= \frac{(1 + e_s)x + (1 + e_d)(1 - x)}{2} \end{aligned} \tag{10}$$

$$b^* = 1 \text{ if } y_s \leq y_d$$

Given effort levels,  $x$  and  $b^*(e_s, e_d, x)$  as summarized by (10), the children's payoffs are described by the following normal form representations:

For  $x \leq \frac{1}{3}$ ,

	<i>Son's</i>	<i>payoffs</i>
<i>D.'s</i>	$e_s = 1$	$e_s = 0$
<i>payoff</i>	$e_d = 1$	$e_d = 0$
	$U(2(1 - x)) - 2\beta(1 - x), U(2x) - 2x$	$U(2(1 - x)) - 2\beta(1 - x), U(x) - x$
	$U(1 - x) - \beta(1 - x), U(2x) - 2x$	$U(1 - x) - \beta(1 - x), U(x) - x$

For  $\frac{1}{3} < x \leq \frac{1}{2}$ ,

		<i>Son's</i>	<i>payoffs</i>
		$e_s = 1$	$e_s = 0$
<i>D.'s</i>	$e_d = 1$	$U(2(1-x)) - 2\beta(1-x), U(2x) - 2x$	$U(2(1-x)) - 2\beta(1-x), U(x) - x$
<i>payoff</i>	$e_d = 0$	$U(\frac{1+x}{2}) - \beta(1-x), U(\frac{1+x}{2}) - 2x$	$U(1-x) - \beta(1-x), U(x) - x$

For  $\frac{1}{2} < x \leq \frac{2}{3}$ ,

		<i>Son's</i>	<i>payoffs</i>
		$e_s = 1$	$e_s = 0$
<i>D.'s</i>	$e_d = 1$	$U(1) - 2\beta(1-x), U(1) - 2x$	$U(2(1-x)) - 2\beta(1-x), U(x) - x$
<i>payoff</i>	$e_d = 0$	$U(\frac{1+x}{2}) - \beta(1-x), U(\frac{1+x}{2}) - 2x$	$U(\frac{1}{2}) - \beta(1-x), U(\frac{1}{2}) - x$

For  $\frac{2}{3} < x \leq 1$ ,

		<i>Son's</i>	<i>payoffs</i>
		$e_s = 1$	$e_s = 0$
<i>D.'s</i>	$e_d = 1$	$U(1) - 2\beta(1-x), U(1) - 2x$	$U(\frac{2-x}{2}) - 2\beta(1-x), U(\frac{2-x}{2}) - x$
<i>payoff</i>	$e_d = 0$	$U(\frac{1+x}{2}) - \beta(1-x), U(\frac{1+x}{2}) - 2x$	$U(\frac{1}{2}) - \beta(1-x), U(\frac{1}{2}) - x$

For each range of  $x$ , we solve for the subgame perfect Nash equilibrium in effort levels and the optimal choice of  $x$  in a series of lemmas.

**Lemma 5** For  $x \leq \frac{1}{3}$ , the equilibrium effort levels for the son and daughter are 1 and 1 respectively. The equilibrium payoff for the parents is:

$$U(2x) - 2x + U(2(1-x)) - 2\beta(1-x)$$

Proof: Due to assumption A(i), it is a dominant strategy for the son to work hard. Likewise for the daughter. ■

**Corollary 6** For  $x \leq \frac{1}{3}$ , maximum parental utility, obtained at  $x = \frac{1}{3}$ , is:

$$r_1 = U(\frac{2}{3}) - \frac{2}{3} + U(\frac{4}{3}) - \frac{4\beta}{3}$$

**Lemma 7** Consider  $x$  which satisfies  $\frac{1}{3} < x \leq \frac{1}{2}$ , let  $x^\#$  solves  $U(x^\#) - x^\# - (U(\frac{1+x^\#}{2}) - 2x^\#) = 0$ . For  $x < x^\#$ , let  $k(x) = U(2(1-x)) - 2\beta(1-x) - (U(\frac{1+x}{2}) - \beta(1-x))$ . If  $k(x^\#) < 0$ , let  $k(\hat{x}) = 0$ . For  $x^\# > x > \hat{x}$ , the daughter will shirk and the son will work in equilibrium. In all other circumstances, both children will choose equilibrium effort levels of 1.

If the daughter works, the son will optimally choose to work. If the daughter shirks, the son will shirk if  $x > x^\#$ . Otherwise he will work. Anticipating the son's best response, the daughter will choose to work if  $x > x^\#$ . If  $x < x^\#$ , she will work if  $k(x^\#) > 0$ . If  $k(x^\#) < 0$ , she will choose to work if  $x < \hat{x}$  and not otherwise.

**Corollary 8** For  $\frac{1}{3} < x \leq \frac{1}{2}$ , maximum parental utility, obtained at  $x = \frac{1}{2}$ , is:

$$r_2 = U(1) - 1 + U(1) - \beta$$

**Lemma 9** Consider  $x$  which satisfies  $\frac{1}{2} < x \leq \frac{2}{3}$ , let  $\bar{x}$  solves  $U(1) - 2\bar{x} - (U(\bar{x}) - \bar{x}) = 0$ . Let  $\tilde{x} = \min(\bar{x}, \frac{2}{3})$ . For  $x < \tilde{x}$ , the equilibrium effort levels for the son and daughter are both equal to 1. Otherwise the equilibrium effort levels are both equal to 0.

Proof: Let  $x < \tilde{x}$ . Then if the daughter exerts effort, the son will also exert effort. If the daughter shirks, the son will also choose to shirk. Given the best responses of the son, the daughter will choose to exert effort. If  $x > \tilde{x}$ , it is a dominant strategy for the son to shirk. Then it is also optimal for the daughter to shirk.

**Corollary 10** For  $\frac{1}{2} < x \leq \frac{2}{3}$ , maximum parental utility is:

$$r_3 = U(1) - 2\tilde{x} + U(1) - 2\beta(1 - \tilde{x})$$

**Lemma 11** For  $\frac{2}{3} < x \leq 1$ , the equilibrium effort levels for the son and daughter are both equal to 0. The equilibrium payoff for the parents is:

$$U(\frac{1}{2}) - x + U(\frac{1}{2}) - \beta(1 - x)$$

Proof: For  $\frac{2}{3} < x \leq 1$ , it is a dominant strategy for the daughter to shirk. Given that the daughter has shirked, it is also optimal for the son to shirk. ■

**Corollary 12** For  $\frac{2}{3} < x \leq 1$ , maximum parental utility, obtained at  $x = 1$ , is:

$$r_4 = U\left(\frac{1}{2}\right) - 1 + U\left(\frac{1}{2}\right)$$

$r_2 > r_1$ .  $r_2 > r_4$ . Finally,  $r_3 > r_2$  and we get proposition 2. ■

Proof of proposition 4:

Using (3),

$$\frac{\partial \tilde{x}}{\partial \beta} > 0$$

Using (2) and the envelope theorem,

$$\begin{aligned} \frac{\partial \widetilde{W}}{\partial \beta} &= -2(1 - \tilde{x}) \\ \frac{\partial^2 \widetilde{W}}{\partial \beta^2} &= 2 \frac{\partial \tilde{x}}{\partial \beta} > 0 \end{aligned}$$

When  $\beta = 1$ , there is no difference in the cost of effort between sons and daughters,  $\widetilde{W}(1) = 2(U(1) - 1)$ . As  $\beta$  increases,  $\widetilde{W}$  decreases at a decreasing rate, starting at  $\frac{\partial \widetilde{W}}{\partial \beta}|_{\beta=1} = -1$ .

When  $\beta = 1$ ,  $W^*(1)$  is also equal to  $2(U(1) - 1)$ .

$$\begin{aligned} \frac{\partial W^*}{\partial \beta} &= -2(1 - x^*) \\ -1 &< \frac{\partial W^*}{\partial \beta} < -\frac{2}{3} \end{aligned}$$

As  $\beta$  increases,  $W^*$  falls at a constant rate because  $x^*$  is independent of  $\beta$ . For values of  $\beta$  close to 1, since  $\frac{\partial \widetilde{W}}{\partial \beta}|_{\beta=1} = -1$ ,  $\widetilde{W}$  is less than  $W^*$ . However since  $\widetilde{W}$  decreases at a decreasing rate, it may be larger than  $W^*$  for larger values of  $\beta$ . So depending on parameter values, proposition (4) obtains. E.g.: Let  $U(x) = 5 \ln(3 + x)$ . This utility function satisfies assumption (1) for  $1 < \beta < 1.25$ .  $W^*(1.1) > \widetilde{W}(1.1)$  whereas  $W^*(1.2) < \widetilde{W}(1.2)$ . ■

## C Data Appendix

**Dowry Values** Dowry values are specified in the marriage contracts written by notaries. The dowry could consist of:

1. cash;
2. movable objects such as linens, clothes, jewels, etc.;
3. houses and shops;
4. land holdings.

The dowry values used in the regression are the sum of cash plus the monetary valuation of movable objects, houses, shops, and land holdings. The monetary valuation of land holdings was either provided by the parties writing the contract or was calculated by multiplying the size of land holdings times the average price per *staioro*.<sup>28</sup> We had to disregard those observations for which we were not given the monetary valuation of houses and shops because the variety and multiplicity of characteristics made impossible to calculate average prices for these goods.

Another issue concerns charitable dowries. The dowry provided by parents was sometimes supplemented by an additional small amount from a charity or the charitable bequests of some wealthy people. These additions were in general very small. However, since theory suggests that it is total wealth that matters to the groom, for the only case (out of 222 marriages) in which a portion of the dowry was provided by a charity, we added this small sum to the dowry. If a girl was orphan, we dropped her from the sample because we could not match her to her natal family in the census.

**Spouses' Ages** The bride's and groom's ages, at the time of the marriage, were obtained from the catasto of 1427. The ages of the groom's and bride's parents were also coded. For those grooms and brides whose parents were dead at the time of the *Catasto*, the ages were estimated by using the

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<sup>28</sup>These prices were carefully calculated. First, we coded exactly the location and types of crops for those contracts that specified the monetary valuation and size of land holdings. Second, we calculated averages for land plots in same location and with same crops. Lastly, we used these average prices to calculate the monetary valuation of those land holdings whose value was not specified in the contract.



following calculations: we took the age of the eldest brother/sister in the household and added 20 years to estimate his/her mother's age (this was the average age at first birth for women), and 30 years to estimate his/her father's age (given that 10 years was the average age gap between husbands and wives in 1427 Tuscany).

**Household Wealth and Occupation** Information on household wealth comes from the catasto. The wealth assessments include: houses, shops, land holdings, shares in commercial partnerships, credits, debts, and shares of government debt.<sup>29</sup>

The catasto also provides information on the occupations of the groom (or the groom's father) and the bride's father. In the regression the dummy variable for occupation takes on the value of 1 when the the groom (or his father, or the bride's father) practices a non-agricultural occupation (example: artisans, merchants, notaries, medical doctors are coded as 1). People practicing a non-agricultural occupation could also own land; however, we want to distinguish between those households whose wealth derived *exclusively* from agriculture and those households whose wealth came from other sources besides agriculture.

**Number of Children and Number of Sons (Daughters)** The catasto also reports the number of siblings in a household, with their gender, age, and marital status.

For marriages before 1427 we added back the daughter to her natal family. As discussed in the text, this does not completely solve the undercounting of daughters.

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<sup>29</sup>Investments in shares of the Florentine government debt were non-existent in Cortona. The major investors in shares of the Florentine government debt were Florentine citizens themselves.

**Table 1: Summary statistics of marriages in Cortona, 1415–1436**

	Mean	Median	Standard Deviation
Dowry (in gold florins)	124.3	70	105.2
Groom's age	28.1	27	8.58
Bride's age	18.7	18	4.94
Age of groom's father	64.9	64.5	10.98
Age of bride's father	54	54	10.52
Groom household's wealth	653	194	1728.
Bride household's wealth	641	159	1993.
Number of children in groom's hh	2.2	2	1.88
Percentage of sons in groom's hh	0.9	1	0.18
Number of children in bride's hh	3.1	3	2.34
Percentage of sons in bride's hh	0.3	0.4	0.27
Household lives in town <sup>a</sup>	.685		
Bride's hh wealth from agriculture <sup>a</sup>	.676		
Groom's hh wealth from agriculture <sup>a</sup>	.707		
<i>N</i>		222	

Note: The marriages refer to both households living in the town of Cortona and in forty-four villages in its countryside.

<sup>a</sup>Figure in percentages.

Sources: Florence, State Archives (hereafter ASF), Catasto 213, 214, 215, 216, 252, 253, 254; Notarile Antecosimiano 1143, 1144, 1145, 1146, 5441, 10038, 18905, 18906, 18907, 18908, 18909, 18910, 18911, 18912, 18913, 18914.

**Table 2: Household structure in Cortona, 1415–1436**

<i>Types of households</i>	<i>Marriages before 1427</i>
Couple coresides with groom's parents	42.8
Couple coresides with groom's widowed father	0.6
Couple coresides with groom's widowed mother	19.9
Couple coresides with groom's siblings	17.9
Couple with no coresidency	18.8
<i>N</i>	167

Sources: See Table 1.

**Table 3: Dowry Contracts in Cortona, 1415–1436**

<i>Contract characteristics</i>	<i>All contracts</i>		<i>Matched contracts</i>	
	Percentage	Shares <sup>c</sup>	Percentage	
Payment (movables)	16.4	0.03	13.0	
Payment (cash)	86.2	0.75	91.8	
Payment (houses; shops)	12.5	0.01	7.2	
Payment (land holdings)	45.7	0.21	40.5	
Deferred payments	53.0	—	58.5	
Contingent payments	21.3	—	23.8	
Profit sharing	0.6	—	0.9	
Other terms <sup>a</sup>	8.8	—	4.5	
Average dowry <sup>b</sup>	114.8		124.3	
Median dowry <sup>b</sup>	64		70	
<i>N</i>	328		222	

Sources: See Table 1.

<sup>a</sup> Some marriage contracts specified other terms: in some instances, a portion of the dowry had to be paid by someone else than the bride's parents (a charity, a relative, etc.).

<sup>b</sup> Figures are in gold florins. The values for all contracts (first column) are calculated for the 292 contracts that provided the value of the dowry.

<sup>c</sup> Average  $\left( \frac{\text{value of type of payment}}{\text{value of total dowry}} \right)$ .

Table 4: Regressions (bride attributes)		1	2	3
<i>Dependent variable</i>		OLS <sup>a</sup> <i>dowry</i>	Median <sup>b</sup> <i>dowry</i>	OLS <sup>a</sup> log( <i>dowry</i> )
Married 1427 and later		3.300 (10.07)	-1.021 (6.022)	0.0228 (0.0670)
2nd marriage dummy		34.62 (31.15)	-1.748 (39.41)	0.1225 (0.1597)
age		4.906 (3.106)	3.953 (4.223)	0.0501 (0.0257)
age <sup>2</sup>		-0.0946 (0.0660)	-0.0859 (0.1032)	-0.0010 (0.0005)
father's age		-0.7295 (0.5045)	-0.3141 (0.3429)	-0.0048 (0.0038)
family's wealth		0.1440 (0.0134)	0.1328 (0.0169)	—
(family's wealth) <sup>2</sup>		-9.22e-06 (9.50e-07)	-8.40e-06 (4.00e-06)	—
family's log wealth		—	—	0.3185 (0.0291)
father's occupation (=1 if non-agricultural)		-4.172 (14.32)	22.80 (16.96)	0.1397 (0.0989)
urban dummy		69.31 (9.966)	40.06 (10.73)	0.6251 (0.0796)
number of siblings		-15.13 (4.037)	-6.631 (3.862)	-0.0781 (0.0289)
number of brothers		18.61 (5.750)	5.920 (5.418)	0.0584 (0.0357)
$R^2$		0.7675	0.5842 <sup>c</sup>	0.7665
$\sqrt{MSE}$		54.57	—	0.4142
$N$		222	222	222

<sup>a</sup> Robust standard errors in parenthesis.

<sup>b</sup> Bootstrap standard errors in parenthesis. No sibling fixed effects.

<sup>c</sup> Pseudo  $R^2$ .

<b>Table 5: Regressions (groom attributes)</b>		1	2	3
<i>Dependent variable</i>		OLS <sup>a</sup> <i>dowry</i>	Median <sup>b</sup> <i>dowry</i>	OLS <sup>a</sup> log( <i>dowry</i> )
Married 1427 and later		11.02 (12.83)	-1.520 (7.768)	0.0842 (0.0679)
2nd marriage dummy		39.96 (29.08)	-1.090 (28.61)	0.1229 (0.1383)
age		9.756 (2.942)	1.605 (2.639)	0.0570 (0.0176)
age <sup>2</sup>		-0.1421 (0.0432)	-0.0285 (0.0438)	-0.0008 (0.0003)
father's age		-1.156 (0.6992)	0.2738 (0.3554)	-0.0072 (0.0039)
family's wealth		0.0847 (0.0185)	0.1064 (0.0300)	—
(family's wealth) <sup>2</sup>		-5.68e-06 (1.22e-06)	-7.22e-06 (3.55e-06)	—
family's log wealth		—	—	0.4077 (0.0297)
father's occupation (=1 if non-agricultural)		34.34 (20.21)	30.15 (27.15)	0.0996 (0.0957)
urban dummy		69.71 (11.92)	37.85 (12.18)	0.5276 (0.0696)
number of siblings		2.145 (6.231)	-1.684 (3.195)	-0.0098 (0.0364)
number of brothers		-5.083 (10.12)	1.960 (3.946)	-0.0830 (0.0507)
$R^2$		0.6363	0.4204 <sup>c</sup>	0.8059
$\sqrt{MSE}$		70.08	—	0.3879
$N$		222	222	222

<sup>a</sup> Robust standard errors in parenthesis.

<sup>b</sup> Bootstrap standard errors in parenthesis.

<sup>c</sup> Pseudo  $R^2$ .