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A S S O C I A T I O N

Parental Investment and Elite Family Structure in Preindustrial States: A Case Study of Late Medieval-Early Modern Portuguese Genealogies

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Parental Investment and Elite Family Structure in Preindustrial States: A Case Study of Late Medieval-Early Modern Portuguese Genealogies

In this paper I examine the idea that patriarchal family structure among elites in stratified societies originates as a form of parental investment favoring male children. Patriliney and restricted inheritance among 15th- and 16th-century Portuguese nobility are analyzed as reproductive strategies aimed at maximizing lineage survival and posterity in the face of high mortality. Demographic data derived from genealogies show that among the high nobility, males outreproduce females, whereas among the lower nobility, females outreproduce males, and that the tendency to concentrate investment in male offspring correspondingly increases with status. This family structural arrangement has the societal effect of generating intense competition among males for available titles, which results in increased warfare mortality among men and indirectly in the increased claustration of women.

ELITE FAMILY STRUCTURE IN TRADITIONAL STRATIFIED SOCIETIES is characterized by a pronounced disparity in the status of men and women. Patrilineal inheritance, the concentration of wealth and power in males, and the social restriction or sequestering of women all typify this patriarchal arrangement. In this paper I take the approach that this pattern of behavior originates as a form of parental investment favoring male children. I argue that sex-biased parental investment is a reproductive strategy aimed at maximizing the potential for lineage survival and posterity generation after generation. I further introduce the idea that elite reproductive strategies have an important effect on the development of state political organization, and I attempt to show that there is a fundamental contradiction between individual (or familial) reproductive interests and the social reproduction of the state political structure. To illustrate this point, I examine how demographic processes originating at the family level interrelate with patterns of competition among lineages over sources of wealth and status among the entire elite population. The case study draws principally upon genealogical demographic data reflecting an intensifying pattern of competition over lands and titles among the nobility of Portugal between the years 1380 and 1580.

Evolutionary Theory and Parental Investment

The idea of patriliney as a form of sex-biased parental investment was first developed by Hartung (1976, 1982) and Dickemann (1979a, 1979b). It is based upon an hypothesis proposed by Trivers and Willard (1973; see Blaffer Hrdy 1986 for a recent review) concerning the evolution of the tendency of parents to manipulate the sex ratio of their offspring according to varying ecological conditions. Trivers and Willard argue that natural selection will favor differential parental investment in offspring of one sex or the other, depending on which sex is likely to produce the most descendants, thereby increasing the parent's own reproductive fitness. Parental investment is defined as any investment of

time or resources by the parent in an individual offspring that increases the offspring's chance of surviving and reproducing at the cost of the parent's ability to invest in other offspring (Trivers 1972). Differential investment in offspring can potentially take the form of pre-zygotic selection of gametes by the female, differential mortality in utero, sex selective infanticide or neglect after birth, or the tendency to invest more time or resources in the rearing of offspring of one or the other sex.

The principal factor affecting differential parental investment is parental "condition," which in the Trivers-Willard model refers to the parents' health or quality of local habitat or territory. Variation in condition affects male and female reproduction in different ways: "a male in good condition is expected to outreproduce a female in similar condition, while females will outreproduce males if both are in poor condition," (Trivers and Willard 1973:90). Among human populations, Trivers and Willard argue that socioeconomic status is the relevant variable corresponding to "condition," to the extent that wealth is positively correlated with reproductive success. As Dickemann (1979a, 1979b) has argued, the typical elite family pattern of sex-biased parental investment seems to fit the predictions of the Trivers-Willard model. However, systematic, quantitative data on elite family reproduction have been lacking. The data on late medieval-early modern Portuguese elites presented below support the Trivers-Willard hypothesis, specifically in terms of sex-biased parental investment after birth in the form of inheritances and dowry payments.

Historical Background and Sources of Data

This analysis is the result of a program of collection and analysis of detailed genealogical data for a 200-year period in the late medieval-early modern European monarchy of Portugal (1380–1580). Portugal during this period provides an instructive case history in the study of elite family demography, resource competition, territorial expansion, and political instability. The period begins with a war of succession with Castile (1383–85) in which a new dynasty was established by D. João I, an illegitimate half-brother of the previous king. This dynastic change marks a major shift in the political character of the Portuguese state. Previously, Portugal had been an oligarchy of powerful landholding families of which the king was the nominal ruler. Under João I, Portugal became a more highly centralized, almost absolutist state, in which much of the land in the kingdom came under his control for redistribution. The old, established families who had supported Castile in the war lost their lands, and João I transferred them to his supporters, most of them landless younger or illegitimate sons of the old ruling class.

Over the next 200 years, the new lineages established by this transfer of wealth proliferated, so that the elite population rapidly began to outstrip the number of existing estates and other titles available within Portugal's territory. The resulting landless elite males, mainly younger sons, participated in and were a main impetus behind Portuguese expansion into Africa and India, which began by 1415. By the mid-16th century, close to 25% of noble males who reached adulthood would subsequently die in expansionist or internecine warfare. Excess elite females, who lacked dowries or potential mates of higher status, entered convents at an increasing rate throughout the period. By the end of the period, approximately 35% of noblewomen who reached early adulthood were being channeled into convents.

The primary data source for this research was the *Peditura Lusitana* (Morais 1942–48), an 11-volume transcribed manuscript containing the genealogies of several hundred medieval and early modern Portuguese noble lineages, or *lignages*.¹ It was compiled by a 17th-century author who used a large array of supplementary documents, including letters of legitimation, land titles, marriage contracts, and military records. The genealogies are patrilineally organized and consist of lists of marriages and offspring engendered by each male in a *lignage*. In cases where men married more than once or had children by concubines, offspring were further divided under each of the mothers, who are clearly identified as to name, father's name, and father's title or position. This permitted the measurement of female reproductive performance for women who were born into and

married back into the collected sample. Figures for reproductive performance and sex ratios were obtained by compiling the lists of offspring by father, mother, status group, generation, etc.

The family listings are very complete and go far beyond the documentation of titled lineage heads. Included are male and female offspring who died in infancy and childhood, as well as men and women who never married or produced offspring and who had no direct genealogical or social significance. Subsequent analysis of data from the *Peditura Lusitana* (Boone 1987) indicates that while there is considerable underenumeration of juvenile deaths, this genealogical source contains accurate listings of individuals who lived to adulthood and entered the social arena as potential competitors for titles or marriage partnerships. Adult sex ratios are somewhat high, averaging about 112 males to 100 females. This could be due to a number of factors, including differential neglect of female offspring during childhood, a factor that has been noted among European populations during later periods (Poulain and Tabutin 1981; Volland 1984; Wall 1981). It is possible that the high adult sex ratios are due to underreportage of women, but if they are, the standards of reportage do not differ significantly from one status group to another. Thus, differences in reproductive performance, nuptiality, rates of claustration, and warfare mortality presented in the analysis are probably not attributable to different standards of reporting of offspring between the different status groups.

The data collected in the 1980–81 investigations in Lisbon were coded and entered into a computerized file now consisting of over 3,700 individuals from the Portuguese *alta nobreza* (high nobility). The study population consists of all the male and female patrilineal descendants of the 25 highest houses, or *lignages*, in Portugal who were born between roughly 1380 and 1580. The social destiny (title, warfare death, religious career, marriage, etc.) of each individual is also recorded in this file, and summary statistics on rates of marriage, warfare deaths, and religious careers were calculated.

Genealogies have been used for demographic studies by several historical demographers, particularly for studies of the European nobility (Henry 1956, 1965; Hollingsworth 1957, 1964; Peller 1965; Peronnet 1968). Hollingsworth (1969:60) has noted that “genealogy-based demographic studies have their special interest since data are unusually complete,” as opposed, for example, to studies based on parish records, where family data can usually be reconstructed for only a fraction of families in a given population. The main reason why genealogies have not been more extensively used in historical demographic studies is that they generally exist only for elite lineages, which are usually considered unrepresentative of the general population. Since elite family reproduction is the central focus of this study, however, this problem will not concern us.

Some limitations of this genealogical data should be noted, particularly with reference to the measurement of reproductive performance. Male fertility is notoriously hard to measure, and I do not pretend here to offer accurate figures on the total number of offspring ever engendered by each male in the sample. The problem of enumeration of illegitimate children is particularly acute, since it is certain that many were never known, acknowledged, or legitimized. Since legitimizing bastard children required a certain investment of time, money, and effort on the part of parents, one would expect men of higher social rank to have more illegitimate offspring recorded simply because they were able to have more legitimized. But there is reason to suggest they engendered altogether more illegitimate offspring in any case since they were less likely to spend long periods of time in military campaigns and were simply exposed to more women for longer periods of time. I will argue that the figures presented in the analysis below accurately represent the number of socially recognized offspring who lived to adulthood.

Measuring female reproductive performance posed a different kind of problem for this study. A considerable number of women born into the population married out of Portugal (usually into the Castillian, Burgundian, or Austrian courts) or into Portuguese lineages that were not collected. Therefore, for this analysis, reproductive performance figures are available only for women who married back into the collected sample, or approximately 32% of all ever-married women born into the population.

An additional limitation of this data source is that birth, marriage, and death dates are very seldom reported. As a result, I have not attempted to incorporate vital statistics or age at marriage data into this study.

Parental Investment and Elite Family Structure

The thesis advanced here is that patriarchy in stratified societies originates as a form of elite "family planning." Human populations in preindustrial states typically suffered very high mortality rates due principally to infectious disease, but also to famine and warfare (Livi-Bacci 1983; Watkins and Van der Walde 1983; see below for data on warfare). Among landholding elites, this resulted in a high rate of lineage extinction (Dickemann 1979b). Hollingsworth (1957:12) found that among children born to British ducal families during the period 1480–1679, 31.1% died before age 15. He cites a figure of 34.1% for the continental European ruling class between 1500 and 1550. Assuming then that at least one-third of all children born to noble families died before reaching adulthood and given the strong emphasis placed on family posterity among the nobility, it seems reasonable to argue that family reproductive strategies that maximized the reproduction of lineages and the potential for lineage survival were important factors determining the structure of elite families.

Patriliney as a reproductive strategy derives from fundamental differences that exist between male and female reproductive biology. Males tend to have a higher reproductive potential than females (contingent, of course, upon the availability of mates), since they typically have longer reproductive spans, incur less risk in the production of offspring (as in death or injury in childbirth), and can maximize reproduction through polygyny. In stratified societies, wealth is the most decisive parameter in determining a male's ability to attract mates and to establish a stable reproductive career. Therefore, where wealth is heritable and has a positive effect on future reproductive performance of offspring, lineages that concentrate inheritance in males will outreproduce those that do not (Hartung 1976, 1982). Hence, the highest-status families may gain more by concentrating investment in male offspring and curtailing or reducing investment in female offspring by eliminating them during infancy (as in the traditional Brahmin and Chinese cases), or channeling them later into nonreproductive roles (as in the medieval European case; cf. Dickemann 1979a, 1979b).

Conversely, where the family fortune is comparatively small, lower-status families may gain more by marrying daughters up than by (or in addition to) attempting to establish sons in society under poor circumstances. The inherited wealth of the daughter's higher-status mate would subsequently improve her reproductive success and that of her future offspring. Thus, we would expect to see the level of parental investment in daughters (in the form of dowries) to be higher among lower-status families than among high-status families.

Hypergyny pulls women out of the lower classes, leaving many lower-status men without mates. In this way, hypergyny reinforces wealth as a determinant of male reproductive performance and contributes to the intensifying pattern of male-male competition over status. Many males at the lower end of the scale lead lives of forced celibacy in what for them is a seller's market and are furthermore engaged in production, construction, and military occupations that tend to raise their mortality rates through occupational hazards and unhealthful conditions. Their poor socioeconomic position and reproductive prospects make them perennial aspirants in large-scale expansionist and insurgent military campaigns through which they might hope to achieve higher positions.

Thus, in traditional societies characterized by a high degree of social inequality, wealth becomes a critical determinant of male reproductive performance. Under the conditions of polygyny and hypergyny that result, male-male competition over wealth intensifies, and male values become centered around physical, military, and sexual prowess. From the male point of view, women and status become increasingly identified with each other, and women themselves become increasingly regarded as a commodity in the culture of elites. In addition, with the increased male parental investment involved in the trans-

mission of the family fortune comes increased male concern over paternity (Dickemann 1981). Thus, women become objects of frustration and suspicion as well as intense fascination, and they are jealously hoarded, sequestered, restricted, abused, and worshipped. Eventually, what begins as a family structural principle becomes fixed and reified at the cultural level through legal codification, art and literature, and other instruments through which patriarchy comes to characterize the culture of elites as a whole.

Specific cultural practices associated with patriarchy can take varied forms depending upon the cultural/historical context in which they develop. The more general characteristics of patriarchy, particularly favoritism directed toward male offspring and intense male-male competition over status, and the disparity between male and female status can be predicted to develop in any situation where the following three conditions are met (based on Trivers and Willard 1973): (1) Resources are unequally distributed among the population (if they were not, there would not be any differential reproduction on the basis of wealth). (2) Wealth is a stronger determinant of male reproductive performance than of female (if it were not, differential parental investment would not make any difference). (3) The socioeconomic status of the parent can be conferred upon the offspring and will endure into the offspring's adulthood (if it could not, differential investment would have no reproduction-enhancing effect for the parent).

Of the above conditions, (1) and (3) can safely be assumed to be operating among elite populations in stratified societies. The second condition requires more detailed quantitative data for verification. In the following section, I present the results of an analysis that shows that the sex- and status-dependent reproductive patterns favoring patriliney were present among elite families in late medieval Portugal. I will further show that the pattern of sex differential parental investment predicted by the above model, that is, increased male bias with socioeconomic status, holds true for the Portuguese case. Following this case study, discussion will turn to the societal implications of the elite family structural and demographic pattern, particularly in terms of its propensity to generate political instability.

Elite Family Reproductive Patterns

In the model developed above, one of the primary conditions favoring the development of patriarchal family structure is that socioeconomic status should be a stronger determinant of male reproductive performance than of female reproductive performance. In order to determine whether these conditions hold in the Portuguese elite population, I compared the reproductive performance of males and females born into four subpopulations grouped by socioeconomic status. Since individuals who died in infancy or youth were not consistently reported in the genealogies, reproductive performance will be defined throughout the analysis as the number of offspring who survived to early adulthood, comprising the next generation's potential breeding population. Four status groups within the Portuguese nobility were defined for this analysis.

1. The first, and highest-status group, consists of the primary lines of each major lineage group including the royal family and the families of dukes, counts, marquises, viscounts, and barons.

2. The second group consists of the royal bureaucracy. These cadet lineages held key managerial offices in the monarchy and include the overseers of the royal and ducal houses, secretaries of accounts and the treasury, key judges, and other officials. Most of these offices were hereditary, and their holders were closely related to the primary titled lineages or the royal family. Many of these officials also had titles to lands and labor in the hinterlands as well.

3. The third group consists of the senhorial class, which was primarily the landed aristocracy. These consisted of cadet lineages who held hereditary titles to lands and associated labor, often in the form of *morgadios*, or entailed estates, but held no higher office in the monarchy.

4. The lowest status group consists of men who held no known title or who held at best a small lifetime ecclesiastical military pension. Most of the men in this category were

cavaleiros, who often spent their careers serving in overseas campaigns, and if they married, spent long periods of time away from their wives. Many of them were members of religious military orders, which provided *comendas*, or lifelong pensions, for some of their veteran members. Otherwise, males in this category served or were supported by the houses of more powerful noblemen. For the purposes of this analysis, all these men are grouped together because they had not acceded to any stable or substantial source of wealth.

The second and third status groups overlapped a great deal in terms of wealth and social status in the hierarchy of the nobility, the main difference between them being the source of wealth they controlled. Reproductive rates, nuptiality, rates of claustration, and warfare deaths for these two middle groups all fall between the primary lineages and the military class (Group 4), and differences between them are probably not accountable for in terms of the evolutionary model developed here.

Tables 1-3 show the reproductive performance of males in the sample grouped by natal socioeconomic status (i.e., parents' status). Table 1 shows that natal status is a significant determinant of reproductive performance among males (Kruskal-Wallis, $p < .001$).² Table 1b presents the average numbers of reported illegitimate children only and shows that the difference in total reproductive performance between primary titled and the lower titled males is due to the addition of illegitimate offspring. Illegitimate offspring, however, do not account for the difference between lower titled males and the military/untitled group. This suggests that other factors, including probability of marriage, number of serial marriages, and age at first marriage, might better account for the difference in reproductive performance between titled and untitled males.

Table 1
Reproductive performance of males grouped by natal status.

Offspring of	A All offspring			B Illegitimate only	
	<i>N</i>	<i>n</i>	\bar{x}	<i>n</i>	\bar{x}
Primary titles	213	624	2.93	131	.62
Royal bureaucracy	291	741	2.55	75	.26
Senhorial	414	1,050	2.54	122	.29
Military/untitled	505	768	1.52	88	.17
Total	1,423	3,183	2.24	416	.29

Kruskal-Wallis (A) $p < .000$, (B) $p < .000$.

*Reproductive performance is defined throughout as the number of offspring that survived to adulthood.

Table 2
Reproductive performance of ever-married males grouped by natal status.

Offspring of	A All offspring			B Illegitimate only	
	<i>N</i>	<i>n</i>	\bar{x}	<i>n</i>	\bar{x}
Primary titles	137	560	4.09	67	.48
Royal bureaucracy	206	715	3.47	55	.25
Senhorial	263	1,016	3.86	88	.33
Military/untitled	308	726	2.36	46	.15
Total	914	3,017	3.30	256	.27

Kruskal-Wallis (A) $p < .000$, (B) $p < .02$.

Table 3
Reproductive performance of ever-married males grouped by attained status.

Offspring	A			B		C
	<i>N</i>	<i>n</i>	\bar{x}	<i>n</i>	\bar{x}	<i>N</i> married more than once
Primary title	96	456	4.75	50	.52	22.6
Royal bureaucracy	168	776	4.62	43	.36	18.5
Senhorial	216	981	4.54	80	.37	13.9
Military/untitled	553	1,287	2.33	127	.23	10.3
Total	1,033	3,500	3.39	300	.29	14.0

Kruskal-Wallis (A) $p < .000$, (B) $p < .03$.

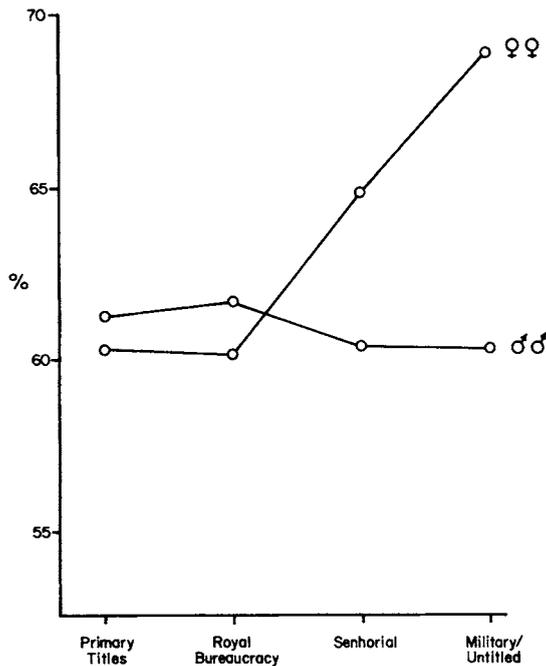


Figure 1

Proportion of men ($N = 1,959$) and women ($N = 1,630$) who ever married, grouped by natal status.

Figure 1 shows that the effect of natal status on probability of marriage is very slight for males. However, Table 2 shows that if the reproductive performance of only ever-married males is considered, the difference in number of offspring due to natal status is still marked. This leaves at least two other potential determinants of the differential reproductive performance among titled and untitled males: number of serial marriages and age at marriage. Reproductive performance was found to increase with number of serial marriages (among the entire population of ever married males: married once, $N = 788$, average number of offspring, 3.69; married twice, $N = 113$, average offspring, 4.50; married three or more times, $N = 15$, average offspring, 6.80). Table 3c shows that the probability of marrying more than once increases considerably with attained status. Age at marriage is probably another determinant of reproductive performance, but because of

the lack of consistent birth and marriage dates for this population, this factor could not be investigated. However, Levy and Henry (1960) show that marriage was earlier among the highest levels of French aristocracy than the lower nobility during approximately the same period.

We can now compare the effects of status on female reproductive performance. Table 4a shows the reproductive performance of ever-married women grouped by natal status. Within this sample, we see that female reproductive performance does not increase monotonically with status, and *that the range of variation is much smaller than among males* (the overall difference is not statistically significant; Kruskal-Wallis, $p < .618$). When the same population is grouped by conjugal status (i.e., husband's status, Table 4b), differences in reproductive performance are greater (Kruskal-Wallis, $p < .09$). Thus, marriage to higher-status males did enhance reproductive performance for women.

Figure 2 summarizes and compares male and female reproductive performance by natal and attained or conjugal status. Two main trends are apparent: (1) status is a stronger determinant for males than females (i.e., the range of variation is less for females) and

Table 4
Reproductive performance of ever-married women.

	A Natal status			B Conjugal status		
	<i>N</i>	<i>n</i>	\bar{x}	<i>N</i>	<i>n</i>	\bar{x}
Primary title	77	291	3.78	79	286	3.62
Royal bureaucracy	70	224	3.20	83	328	3.95
Senhorial	116	418	3.60	122	462	3.79
Military/untitled	77	256	3.32	80	209	2.61
Total	340	1,189	3.50	364	1,285	2.87

Kruskal-Wallis (A) $p < .614$, (B) $p < .018$.

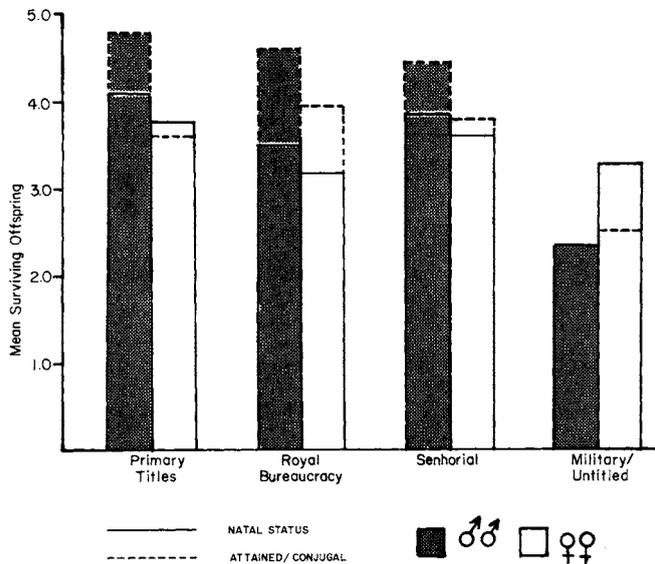


Figure 2
Reproductive performance of men and women grouped by status (compiled from Tables 1-4).

(2) high-status males outreproduce high-status females, but low-status females outreproduce low-status males.³ The data in Table 4b on the effect of conjugal status suggest that this last pattern is due to hypergyny among lower-status women. The pattern of male and female nuptiality (Figure 1) is consistent with a hypergynous mating system: at the lower end of the scale more women marry than men; at the top, more men than women.

Given the higher reproductive potential of males at the top end of the scale and of females at the lower end, a corresponding pattern of differential parental investment in offspring according to sex would be expected. According to the model presented above, parental investment should be concentrated in favor of males among high-status families, whereas female offspring should be favored among lower-status families.

In the Portuguese case, there is clear evidence that parental investment in female offspring was greater among the lower nobility than among the primary titled lineages. Figure 1 shows that daughters of the lower nobility were more likely to marry than their brothers, and that their probability of ever marrying exceeded those of women from the titled nobility as well. Since marriage of female offspring involved the payment of a dowry, rates of marriage have a direct correspondence to levels of parental investment. In the case of lower-status families, the comparatively small amount of wealth that might have been heired to a son is instead transferred to the son-in-law in the form of a dowry. The dowry effectively buys status for the daughter (and her future offspring), which translates into reproductive performance.

Figure 3 clearly illustrates the contrasting pattern of gender bias between the upper and lower nobility. Among women, the percentage of claustrations increases with status, a result of the fact that higher-status families were less likely to invest in dowries for their daughters.⁴ Among men, the percentage of warfare deaths decreases with status, showing that higher-status males were more likely to inherit and establish themselves in Portugal rather than to spend their careers in military campaigns.

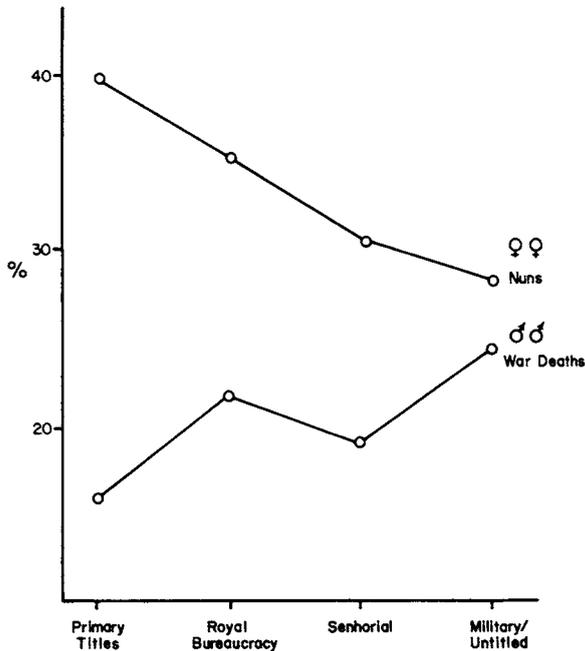


Figure 3

Proportion of women who became nuns and men who died in warfare, grouped by natal status; from a sample of 1,959 men and 1,630 women who lived to early adulthood.

Primogeniture as Reproductive Strategy

The positive relationship between wealth and reproduction is continuously undermined in the sense that wealthy families that produce many offspring produce in turn many consumers of wealth (Herlihy 1973; Cooper 1978:238). An emergent characteristic of elite family structure in stratified societies is the restriction of familial wealth to one line. Primogeniture is likely to develop as a reproductive strategy where wealth is a strong determinant of reproductive performance and where high mortality makes large family size a necessity in ensuring lineage posterity. In other words, primogeniture can be interpreted as a kind of hedging that occurs when restriction of family size per se is too risky due to high mortality. As we have seen, restriction of inheritance at the top of hierarchical social system initially takes the form of a shift to patriliney. As competition intensifies, even more restrictive measures, such as primogeniture, typically appear.

Primogeniture tends to develop where the source of wealth is stable, predictable, and dependable (i.e., controllable through time), where this wealth is unequally distributed among the population, and where specific personal abilities or attributes are not overly important to the maintenance of the source of wealth. Such would be the case where wealth is in the form of rights to the surplus produced by a subject agrarian infrastructure already in place, and where these rights are a matter of inheritance of a title.

The importance of the stability and predictability of resources as determinants of inheritance patterns can be illustrated by comparing the lands-and-labor-based aristocracy of Western Europe with the elites of the Italian city-states during the same period (example based on Herlihy 1977). In the Italian case, the primary source of wealth was speculative enterprise, in which financial success was dependent upon personal expertise and a good deal of chance. Family wealth required constant tending and could rise and fall in the space of a generation. Here, wealth was customarily divided up more or less equally among males, often in their early teens. The young men would go to work in counting houses, receive training in finance, and wait for their "main chance" at financial success, which might not come until middle age, if at all. The strategy here was clearly a different sort of "hedging of bets" on the part of wealthy parents. Among the landed aristocracy of Western Europe, this kind of hedging was unnecessary, since although yearly fluctuations in production were to be expected, lands and labor constituted a stable source of wealth from generation to generation.

Primogeniture is often interpreted as a social means of institutionalizing succession and stabilizing competition in a society where there are always more "applicants" than positions (Goody 1966; Johnson 1978; Service 1973). This functional interpretation is partially correct in the sense that primogeniture has this *effect*. By subordinating and dispersing excess personnel at the family level, the existing hierarchy is stabilized and preserved at the societal level. But while primogeniture may constitute an effective strategy for the maintenance of individual family fortunes and for stabilizing succession, it ultimately creates a highly competitive, volatile situation at the societal level with respect to the problem of excess cadet males. Rulers must choose between dispersing these individuals, for example, in expansionist campaigns, or facing disorder and overthrow on the home front.

The relatively well-known sociopolitical effects of primogeniture in medieval and early modern Europe provide an instructive case. In Europe, Georges Duby (1977) sees a shift from cognatic descent to patriliney and restricted inheritance as early as the 10th century in northern France (see Mattoso 1980, on this development somewhat later in Portugal). As noble lineages proliferated and competition over lands and labor intensified, primogeniture produced increasing numbers of downwardly mobile younger sons. Born with high expectations, imbued with military values throughout their youth, and entering the social world as adults with few prospects for advancement, these youths posed a constant threat to the political stability of preindustrial Europe. Duby refers to the landless younger sons as the "spearhead of feudal aggression" and has shown that expansionist episodes such as the Crusades were church-state strategies to control domestic violence

generated by the younger sons and to “export” it outside Christian Europe against other polities. By the 15th and 16th centuries, with the development of gunpowder warfare and transoceanic sailing vessels, this pattern of dispersal of social subordinates would result in the spread of European populations over much of the planet (Boone 1983; Wallerstein 1974:41).

Figure 4 shows that primogeniture was a strong determinant of male dispersion and mortality among the 15th- and 16th-century Portuguese nobility. This histogram shows that warfare deaths increase with birth order, reflecting the fact that younger sons were more likely to spend their entire careers at risk. Furthermore, younger sons who were killed were more likely to be killed much farther away, in India, than their elder brothers, who as youths participated in the nearby Moroccan campaigns, but soon returned to Portugal to take their place in society.

Birth order affected not only dispersion and mortality rates, but, as a critical determinant of status, determined as well who would reproduce and how much. Table 5 clearly illustrates the effects of birth order and restricted inheritance on male reproduction in the Portuguese case. Figure 5 suggests that the general effect of birth order on reproduction is linked to probability of marriage. This is confirmed by Table 5b, which shows the same data for ever-married males only: reproductive performance no longer increases monotonically with birth order, and the overall differences are not as great (Kruskal-Wallis, $p < .09$).

Birth order had a catastrophic effect on probability of marriage among women as well⁵ (Figure 5), and hence, upon reproduction (see Table 6). Interestingly, eldest daughters were favored in the same way as sons. Dowry competition and the resulting restriction of marriages among female offspring were themselves closely tied to the effects of primogeniture, since primogeniture limited drastically the number of marriageable males throughout the system.

Resource Competition in Social Hierarchical Systems

The model of resource competition developed here differs from traditional population-level approaches in two important ways. First, this kind of resource competition can occur

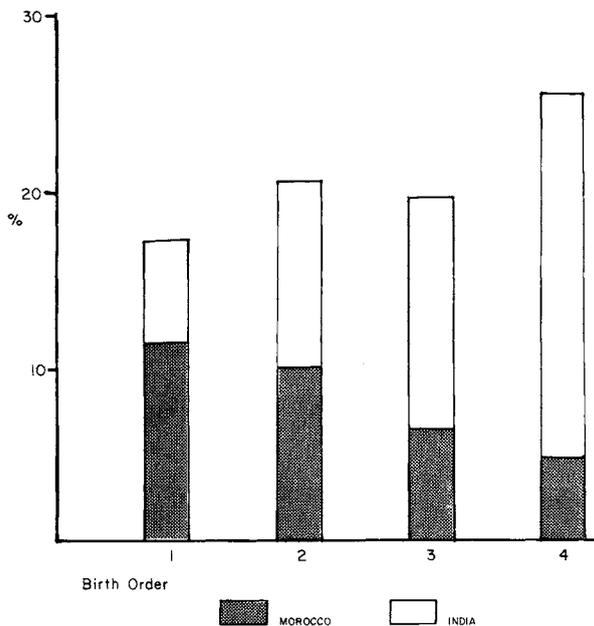


Figure 4

Proportion of males who lived to adulthood, who subsequently died in warfare, grouped by birth order; each bar is further divided by place of warfare death.

Table 5
Reproductive performance of men grouped by birth order.

Birth order	A All men in sample			B Ever-married men only		
	<i>N</i>	<i>n</i>	\bar{x}	<i>N</i>	<i>n</i>	\bar{x}
1	504	1,561	3.10	376	1,547	4.11
2	366	843	2.30	223	785	3.52
3	240	447	1.86	111	422	3.80
4+	261	434	1.66	102	386	3.78
Total	1,371	3,285	2.40	812	3,140	3.87

Kruskal-Wallis (A) $p < .000$, (B) $p < .09$.

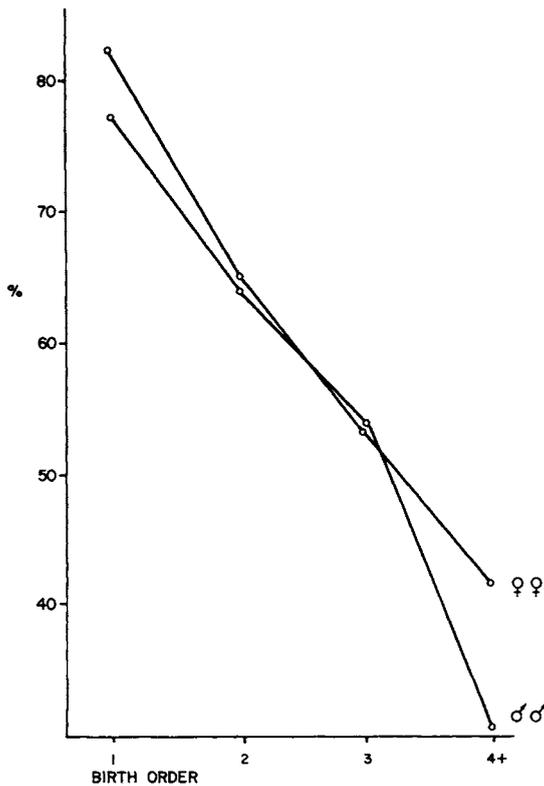


Figure 5
Proportion of ever-married men and women grouped by birth order.

at population densities well below the subsistence-carrying capacity of the land itself. Second, among the elites in stratified societies the object of resource competition is not necessarily the resources themselves (i.e., in terms of subsistence requirements, etc.), but the social status that control of resources confers to males. From an evolutionary point of view, status competition in patriarchal societies is ultimately a form of male-male *reproductive* competition, in which males compete over resources that will confer upon them status, which in turn guarantees access to women.

Comparing the size of a pool of socially qualified competing individuals (i.e., young noblemen entering adulthood) against the number of discrete subterritories (i.e., indivi-

Table 6
Reproductive performance of ever-married women grouped by birth order.

Birth order	<i>N</i>	<i>n</i>	\bar{x}
1	143	528	3.69
2	61	238	3.90
3	30	94	3.13
4+	21	43	2.05
Total	255	903	3.54

Kruskal-Wallis $p < .050$.

sible estates or political offices) available to them would constitute an effective measure of the intensity of competition within a polity at any given time. This intensity could be expected to fluctuate through time with the size of the pool and with the amount of wealth available for redistribution. The intensity of competition in a social hierarchy can be "adjusted" politically by various means. Rulers can make more lands or titles available through subdivision of lands within the state's territory, or through the redistribution of other forms of wealth or booty. Rulers might also deal with competitive demands by encouraging subordinates to undertake warfare or expansionist campaigns against other polities, as with the example of the Crusades and early European expansionism.

From a sociodemographic point of view, then, the study of political instability and warfare in early states involves two issues: (1) what kinds of demographic processes change the size and composition of the pool of competitors in such a system; and (2) what kinds of political adjustments are most important in regulating the intensity of competition. In the sections above, I have discussed several sociodemographic processes that have a direct effect on patterns of resource/status competition among elites in preindustrial states. Figure 6 illustrates how these interrelated factors produce a deviation-amplifying effect that I would suggest is an underlying sociodemographic factor contributing to the inherent instability and expansionistic tendencies of preindustrial states.

In the first place, intense male-male competition is likely to develop where resources are unevenly distributed within the population, and where such resources are stable, predictable, and controllable conferrers of status (control of agricultural surplus would be a prime example). As competition for sources of wealth increases, differences in wealth become increasingly important determinants of a male's ability to establish a stable reproductive career and to ensure the survival of his lineage. As control over resources shifts to male lines, competition among elites is intensified by two factors (see flow chart in Figure 6). First, through differential investment in male offspring, the sex ratio of the elite population becomes increasingly biased in favor of males. Second, patriliney and restricted inheritance become more widespread with increasing status competition among elites, which tends to generate increasing numbers of excluded males of elite rank. Thus, family strategies aimed at ensuring lineage survival and posterity generate competition among elites at the societal level, which is typically manifested in political instability, warfare, and territorial expansion.

In the following discussion, I will use the Portuguese genealogical data to illustrate how these processes manifested themselves through time in 15th- and 16th-century Portugal. Since birth, death, and marriage dates were unavailable for the majority of individuals in the sample, independent chronological grouping of the data was not feasible. However, since the population is genealogically organized, it was possible to order each individual by generation within his or her particular lineage. To approximate the growth rate of population through time all individuals were then grouped by generation order, and each generation was treated as a "cohort." In the first generation, most of the individuals in

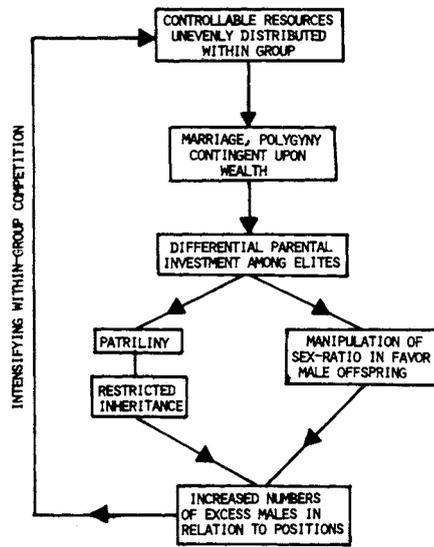


Figure 6
Sociodemographic processes leading to intensifying resource competition among elites.

the "cohort" were born between 1380 and 1430. Individuals in the fifth generation were born roughly between 1530 and 1580.

In Figure 7, males who came of age are grouped by generational cohort, and the changing proportions of each of the defined social status categories are traced through time. This method of grouping oversimplifies the real situation in the sense that it treats each new generation as if it were a clearly demarcated event and as if all lineage generations were perfectly synchronous. In actuality, there is generational overlap and the accession to and vacation of titles is a continuous process.

Figure 7 shows that the proportion of military and untitled males increases from 41% to 76% during the period. The increase in the military/untitled portion of the population (as well as in the clerics, e.g., monks) is due to the fact that the number of males who are noble by birth increases with each generation, while the number of discreet titles remains the same, or increases at a much slower rate. Thus, we can say that the intensity of competition for titles among the nobility, measured in terms of number of males in relation to the number of individual titles, nearly doubled over the course of 200 years. This 200-year period was precisely the time period during which Portuguese expansion reached its zenith and in which warfare deaths among the nobility reached as high as 25% (see Figure 8). For women, this was the age of convents. Figure 8 gives the proportion of women who entered cloisters, again grouped by generational cohort. The drastic increase in the proportion of warfare deaths and claustrations clearly parallels the pattern of increasing competition among males over titles revealed in Figure 7.

We are now in a position to investigate the effects of this pattern of intensifying competition on reproductive performance of men grouped by generational cohort. In Table 7 we see that the average reproductive performance among the entire male population drops by half. The proportion of males who produced no surviving offspring increases 100%. Even among ever-married men (Table 7c), reproductive performance drops by nearly 40%. This decrease among married men is probably due to increasing age at marriage although, as pointed out above, this could not be directly investigated. However, increasing age at marriage during this period has been documented in other studies. Hollingsworth (1957:14), for example, has shown that average age at marriage among British ducal families increased from 22.4 to 30.5 for males and 17.1 to 24.7 for females from the 14th to the 18th centuries (see also Hajnal 1965:114-115).

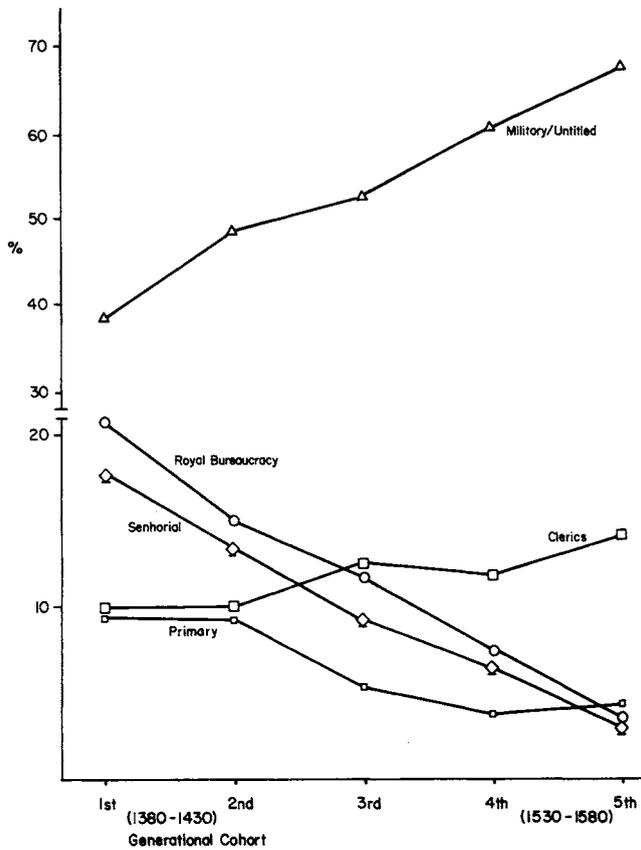


Figure 7

Changing proportional representation of each of the defined status groups within the population (males only, $N = 2,059$), grouped by generational cohort.

The general pattern is one of increasing variance in reproductive performance among males: reproduction is being concentrated in a smaller and smaller proportion of the population as competition over titles increases. By grouping the offspring of each generation by sex, we can gain a rough idea of what is happening to the sex ratio in response to increasing competition. The model above (Figure 6) predicts that with increasing variance in male reproduction, the sex ratio at the top of the social hierarchy should increase in favor of males. Table 8 shows the sex ratio of the offspring who lived to adulthood of each succeeding generation. If the ratio is taken simply in terms of the number of living males and females who reached adulthood, there does not appear to be any distinct pattern other than a distinct general bias in favor of males. However, if the women who were channeled into celibate religious roles are removed (since they are no longer a part of the breeding population), there is a definite increase in the sex ratio as it is defined in those terms. More women are entering convents with each succeeding generation.

Conclusions

The data presented in the first part of this article suggest that there is a link between the reproductive potential of sons and daughters under varying economic conditions and sex-biased parental investment. Further confirmation of the model awaits a more complete demographic data source that would allow detailed analysis of fertility, nuptiality, and mortality patterns. Elite family structural patterns are further shown to have a developmental relationship with intensifying male-male competition within the elite pop-

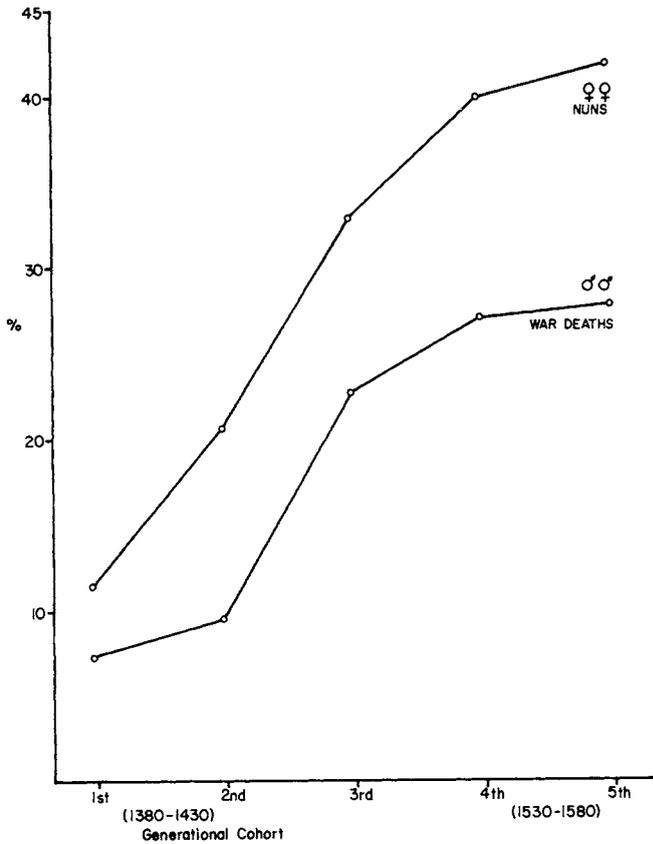


Figure 8

Proportion of women who became nuns and men who died in warfare, grouped by generational cohort. Clausturations and warfare deaths increased with the intensity of competition over titles during the period 1380-1580 (compare with Figure 7).

Table 7
Reproductive performance of men grouped by generational cohort.

Generational cohort	A All men in sample				B % ever married	C Ever married only			
	N	n	\bar{x}	% < 1		N	n	\bar{x}	% < 1
First	102	331	3.25	27.5	75.5	77	316	4.10	9.1
Second	169	568	3.36	28.4	79.9	135	551	4.08	14.8
Third	326	1,034	3.17	34.4	70.6	230	951	4.13	15.7
Fourth	536	1,087	2.03	46.5	60.4	324	1,009	3.11	20.7
Fifth	475	718	1.51	60.6	56.7	269	685	2.55	34.9
Total	1,608	3,738	2.32	45.1	64.4	1,035	3,512	3.39	21.6

Kruskal-Wallis (A) $p < .000$, (C) $p < .000$.

ulation as a whole, and that this competition is related to political instability and territorial expansion within the Portuguese monarchy. The case study presented here of a society characterized by monogamous marriages, although a certain degree of concubin-

Table 8
Adult sex ratio of offspring grouped by parents' generational cohort (legitimate offspring only).

Generational cohort	Males	Females	Ratio	Females (excluding nuns)	Ratio ^a
First	139	140	99.3	129	107.8
Second	265	225	117.8	188	141.5
Third	438	387	113.2	276	158.5
Fourth	464	378	122.7	248	187.1
Fifth	282	275	102.6	163	173.0
Total	1,588	1,405	113.0	1,004	158.2

^aOf marriageable men and women only.

age existed, particularly among the highest-status males. In institutionally polygynous societies, most of the effects analyzed here can be expected to be greatly magnified. Indeed, stratified societies with institutional polygyny exhibit greater disparity between male and female status, and political systems associated with them appear to be somewhat more fractious and unstable than monogamous systems (Alexander 1981).

The sociodemographic pattern analyzed in this paper has a number of similarities with the model of sex ratio deviation, mate competition, and warfare associated with nonstratified patrilineal, polygynous societies like the Yanomamo (Divale and Harris 1976). The point of view developed in this paper differs from Divale and Harris in that the demographic pattern is seen as resulting from individual adaptive strategies rather than group level adaptation aimed at controlling population density (cf. Bates and Lees 1979). This does not affect the comparison of the two models on a descriptive level. More important to the present argument is that the *conditions* of competition differ. In primitive warfare, sex deviations create mate shortages for males. The result is male-male competition directly over mates, which takes the form of intervillage raiding. In stratified societies, the sex ratio of the elite population may be strongly biased in favor of males, but this does not create a mate shortage for males, at least in the upper classes, since mates are drawn up from the more numerous lower social strata through hypergyny. Instead, competition is over resources that confer status on males, which in turn allows them to marry and establish stable reproductive careers. As was previously argued, this pattern of competition promotes political instability, which leads to state-level strategies aimed at redirecting competition against neighboring politics. Thus, both systems are ultimately driven by reproductive competition. In neither case does warfare or political instability result from lack of sufficient food resources on the part of the population at large.

Notes

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¹A *lignage* is defined by Goody (1984:228, 295) as an "agnatically based group of lineal kinsfolk" associated with an "aristocratic 'house' whose identity over time is assured by a landed estate, claims to offices, titles, or other relatively exclusive rights." The Portuguese genealogies, or *nobilitarios*, are organized around a series of primary *lignages* associated with ducal or other high-ranking houses, along with their associated cadet lineages, each of which is tied to a lesser estate or title.

²The Kruskal-Wallis One-Way Analysis of Variance (corrected for ties) was used to test differences in reproductive performance throughout, due to nonnormal distributions of values in many cases.

³Differences between male and female reproduction among the top three status groups were not statistically significant: primary nobility, $p < .867$; royal bureaucracy, $p < .650$; senhorial, $p < .545$ (all Kruskal-Wallis tests for differences in natal status); the differences are, however, all in the same direction predicted by the model. The difference between male and female reproductive performance among the military/untitled group (natal status) was significant: $p < .024$.

⁴It should be pointed out that in the 18th century, Portuguese families paid "dowries" to convents upon their daughters' entrance into the religious profession (Jose Mattoso, personal communication). While I am not aware of evidence that this was done in the 15th and 16th centuries, it is possible that such a practice existed then as well. For the purposes of this argument, it will have to be assumed that such "dowries" (in effect, paid to cover living expenses in a rather austere social setting) amounted to less than those which were invested in arranging a suitable marriage.

⁵For males, birth order was explicitly noted (except when illegitimate) along with notations concerning inherited titles, marriages, etc. Birth order of sons corresponded with the order in which their names initially appeared under their parents' names. The birth order of daughters was explicitly noted less often, but appears to correspond to name order in the same manner as with sons. In any case, birth order for daughters was assumed in all cases (except illegitimate births) to correspond to name order.

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