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Bequests, sibling rivalry, and rent seeking

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Abstract We examine bequest-sharing rules where sibling rivalry creates wasteful competition for intergenerational transfers. We show that equal division of bequests minimizes rent-seeking expenditures by siblings while primogeniture maximizes rent-seeking costs. Our results lend theoretical support to the empirical findings of equal bequests without appeal to complex models of the parent-child relationship.

Keywords Rent seeking · Bequests · Gifts · Sibling competition

1 Introduction

It is generally conceded that the predictions of the standard models of intergenerational transfers are not matched by the observed pattern of bequests in the United States. The data (Wilhelm 1996; Dunn and Phillips 1997) show a pronounced tendency toward equal division of bequests among the deceased's children. The two main theoretical models of inheritance—parental altruism and parent-child exchange—predict an unequal division of assets. The conflict between the predicted and observed pattern of bequest shares has been termed the "equal division puzzle."

The equal division puzzle has stimulated a number of theoretical papers that have developed sophisticated models of the parent-child relationship in order to come up with a rationality based explanation for the observed equality of bequests. Despite all of the work done to explain inheritance practices, little attention has been paid to the rent-seeking aspects

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of bequests and intergenerational transfers. The focus has been on the strategic interaction between parents and their children but not on the interaction between and among the children themselves. In this paper we add another dimension to the question of bequest division by considering the rent-seeking behavior of siblings competing for intergenerational transfers. Utilizing a simple bequest game played by rivalrous siblings, we show that an equal division rule minimizes aggregate rent-seeking expenditures. Strong favoritism, where one child receives over half of the total estate, results in greater rent-seeking costs than equal division, and the costs rise with the bequest share of the favored child. Primogeniture (or more generally, unigeniture) maximizes aggregate rent-seeking expenditures. To our knowledge, no one has formally modeled sibling competition for intergenerational transfers.[1]

2 The literature

The early literature on bequests is divided between parental altruism and parent-child exchange as the motivating factor behind bequests and *inter vivos* gifts. The altruism model (Becker and Tomes 1979; Tomes 1981) predicts that bequest shares will vary inversely with the child's wealth. Bequests essentially compensate for bad luck or bad investment choices by children. Hamermesh and Menchik (1987) build a model incorporating uncertainty about parental death and find empirical support for larger bequests with longer planning horizons and smaller bequests with longer than expected lifetimes. The exchange model (Bernheim et al. 1985), on the other hand, predicts that bequests will be positively correlated with sibling behavior that is valued by the parents, such as visits and phone calls made by children to their parents after the children leave home or parental care during old age. The more the valuable services provided to the parents by the child, the greater the child's bequest. Empirical evidence on bequest division is mixed but seems to suggest that equal sharing is the most common practice in the United States, a result that does not support either model very well.

More recently, Stark (1998) and Bernheim and Severinov (1999) have developed models in which children care about the strength of the feelings their parents have for them personally, which the children infer from the division of their parents' estate. Stark assumes that a child's utility depends positively on the absolute size of his bequest and negatively on his level of relative deprivation, defined as the difference between his bequest and the largest bequest made to his siblings. Assuming that the child with the largest bequest share receives no additional utility from being on top, altruistic parents maximize their utility by choosing equal division.

Bernheim and Severinov also assume that children care about how much their parents love them relative to their siblings and use bequests as a signal of parental affection. They show that under certain conditions altruistic parents, whether they in fact love their children equally or not, choose equal bequests so that their kids will not suffer from any perceived inequalities in parental affection. Thus, equal division becomes the social norm.[2]

[1] Buchanan (1983) discussed the relevance of rent seeking in the design of bequest institutions or norms, but did not derive equal division as a rational, rent-seeking-minimizing outcome.

[2] Others have noted that equal division has not always been the social norm in either the United States or in other parts of the world. Chu (1991), for example, argues that the practice of primogeniture was once widespread in Asia and arose as the rational response of parents to the high mortality rates of their offspring. Assuming that parents wish to perpetuate their family name (or genes), bequests improve the probability that one's offspring will survive to reproduce themselves. If the resource base of any generation of offspring is

In the models discussed so far, bequest behavior is driven by parents' altruistic feelings toward their children. The children themselves either remain the passive recipients of their parents' generosity or try to take advantage of their parents' altruism to increase their bequest. Sibling rivalry shows up only as the unavoidable utility losses when one child is treated differently from another. Sibling rivalry may result in hurt feelings, but it is not the source of any strategic behavior between siblings. The possibility of active sibling rivalry has been suggested by Buchanan (1983). Buchanan argues that rules of inheritance which restrict parental choice, such as primogeniture, are socially preferable to parental discretion because rules reduce wasteful rent seeking among children compared to what would occur under unbridled sibling competition for bequest shares. Given parental discretion, potential beneficiaries of the parents' bequest will compete for larger shares of the estate, thereby reducing the size of the net bequest. Where custom, law, or parental commitment fixes the identities and shares of the beneficiaries, the incentive to curry the favor of parents is removed. Buchanan points out that rules do not necessarily end rent seeking as such efforts will likely shift from seeking a larger bequest share to changing the rules governing bequests. Although unstated, the presumption seems to be that total rent-seeking costs will be lower under a non-discretionary inheritance rule.

Some of the more recent papers in this area (Bernheim and Severinov 1999; McGarry 1999) have sought to explain not only the pattern of bequests but also *inter vivos* gifts. McGarry, for example, assumes that children are liquidity-constrained while their parents are still alive and that parents are altruistic toward their children but uncertain about their children's permanent incomes. The predictions are that bequests will be inversely correlated with permanent income and that gifts will be inversely correlated with current income. Again, children are treated as passive in the sense that they do not actively compete with one another.

A conceptual difficulty in matching theory to the practice is defining what should be counted as a gift. The data on gifts, which indicate that gifts are less equally distributed than bequests (Dunn and Phillips 1997), are taken from tax returns. It includes large cash transfers and certain in-kind transfers like houses, but excludes hundreds of other types of gifts, running from interest-free loans to paid vacations.[3]

Whatever the motives for bequest and *inter vivos* gifts may be, rent seeking is relevant. Further, sibling rent seeking will reduce parental welfare. If altruism drives bequests, then sibling rent seeking erodes the size of the net bequest. Parents would consider the (negative) rent-seeking repercussions of the bequest rule they adopt. If gains-from-exchange motives drive bequests, rent-seeking expenditures reduce the parents' net gain from the exchange akin to a transaction cost that parents would seek to minimize.[4] Either way, if the choice of a bequest rule affects total rent-seeking expenditures, parents will account for the effect whether they are altruistically or selfishly motivated.

In the next section of the paper we describe a transfer game played by competing siblings and show that an equal division of the estate belongs to the family of waste-minimizing bequest rules. Thus, our theoretical result provides an alternative explanation of equal division.

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too low, the family line may die out. Assuming that economies of scale exist in producing survival probabilities, the threat of lineal extinction is minimized by leaving all of the estate to just one child (unigeniture). As standards of living increase and morbidity and mortality rates decrease, the demand for primogeniture falls. Alston and Schapiro (1984) argue that the choice between primogeniture and equal division in colonial America was based on economies of scale in ownership of agricultural land.

[3] Dunn and Phillips's (1997) analysis of the AHEAD survey includes in their measures of gifts title to the parents' home and domiciliary privileges while the parents are still living.

[4] See Becker (1983) for a similar application of this argument to rent seeking through the political process.

3 The bequest game

Our model consists of parents and their $N > 1$ children. We analyze the parent-child bequest interaction as a two-period game in which the parents establish fixed bequest shares, and then children determine their optimal rent-seeking expenditures and, thereby, the bequest-gift mix received from parents. Parents care about their children's net consumption and intend to leave a fixed total amount of wealth in the form of bequests and gifts to their kids. An integral part of our model is that we assume that parents prefer that their children refrain both from seeking to influence their shares and squabbling among themselves. Children are neutral towards their parents and their siblings. Parents and children care about the children's net consumption, which depends positively on the sum of bequests and *inter vivos* gifts transferred to them and negatively on expenditures made to influence the amount of the bequest and gifts received by the child. The more transfers one child receives, the less the other children collectively receive. This creates an incentive for children to compete for bequests and gifts. Others (e.g., Hillman and Riley 1989) have shown that in an unrestricted rent-seeking environment, total rent-seeking expenditures will equal the size of the transfer. That is, competition for bequests and gifts exhausts the value of the transfer. In our game we will assume that there are no claimants to the inheritance pools other than the children and that the estate is perfectly liquid. There is no discounting, no differences in the tax treatment of gifts versus bequests, and no difference in tax rates faced by the siblings.

For their part in the game, parents maximize their own utility, $U = (\mathbf{W} - \mathbf{E}, \mathbf{X})$, where $\mathbf{W} - \mathbf{E}$ is the aggregate, fixed amount of wealth ($\mathbf{W}$) transferred to children net of aggregate rent-seeking expenditures ($\mathbf{E}$) by them, and $\mathbf{X}$ is a vector of other parental objectives. Parents adopt and commit to a bequest distribution $\boldsymbol{\alpha} = (\alpha_1, \ldots, \alpha_N)$, where α_k is sibling k's share of the bequest pool B. The bequest share is assumed to be fixed and immune from any sort of pressure brought to bear on the parents by their children to increase their shares.

While it is relatively easy for parents to fix the distribution of bequest shares (by writing and filing a will, for example), we argue that it is more difficult to pre-commit to a gift distribution. One reason is that if we take a broader view of gifts than planned, taxable *inter vivos* gifts, many, if not most, transfers from parents to their children are situational specific—Junior's emergency no-interest loan, Sister's wedding expenses, Sonny's seed money to take advantage of a business opportunity, Missy's study abroad, and so on. Unlike planned gifts, such as large cash disbursements, the unpredictable nature of parent-child transfers and the relatively long period over which they can occur make it difficult to track expenditures on each child for the purpose of maintaining a fixed distribution. Another reason why commitment may be more difficult with gifts than with bequests is that the consequences of making (or not making) *inter vivos* gifts are generally observable by the parents while the consequences of a given bequest distribution are not. Thus, parents may be more susceptible to the Samaritan's dilemma with gifts than bequests. If parents are vulnerable to the Samaritan's dilemma (see Bruce and Waldman 1990), they may not be willing to commit themselves to a fixed distribution rule.

But even if the parents choose a fixed bequest distribution, there is another way in which children can engage in rent seeking. Knowing that one is going to receive a smaller bequest share than one's siblings will induce that sibling to try to convince the donor-parent to spend more resources on her prior to the parent's death in the form of *inter vivos* gifts. The more that is spent on *inter vivos* gifts, *ceteris paribus*, the less will be available for transfer at death.[5] If one's expected share of the bequest pool is small enough, it may pay to move

[5] Gift-seeking may also occur if discount rates are sufficiently high. Hillman and Riley (1989) show in a game with a fixed prize (like t in our model) that total rent-seeking expenditures are $N/(N-1)$ of the prize where

assets from it (and thus receive a smaller bequest) in order to increase one's consumption of parental gifts.

Parents choose and announce to their children the distribution of the parents' estate B among the parents' N children. Each child's share of the bequest pool α_k is fixed and immune from pressure brought to bear on the parents by any child, where $\sum \alpha_k = 1$. Child k will be called *favored* or *unfavored* depending on whether α_k is greater than or less than $1/N$. Each child also receives pre-bequest gifts from his parents equal to g_k, where $\sum g_k = G$. The more that parents spend on gifts, the less is available for the bequest pool, and *vice versa*.

The N children compete in a Tullock-type, imperfectly discriminating contest for the right to transfer an amount $t < \min(G, B)$ to or from the bequest pool (see Tullock 1980; Hillman and Riley 1989). In their sub-game children cannot affect the sizes of their bequest shares, but can affect the size of the total bequest pool B by choosing their rent-seeking expenditures e to maximize their net expected payoffs. If the winner of the contest chooses to make a transfer to the bequest pool, each sibling receives $t\alpha_k$. Each non-winning sibling also loses $t/(N-1)$ in gifts, that is, the reward to a winning bequest-seeking sibling come out of the gift pool available to the other siblings. If the winning child chooses to transfer from the bequest pool, the winner receives an increase in gifts equal to t, and every sibling suffers a loss of $t\alpha_k$ in terms of reduced bequests. Basically, any additions or subtractions to the bequest pool are apportioned among siblings in accordance with their fixed shares. Any increase in gift spending accrues solely to the winning child, and all non-winners share any reductions in total gift spending equally.

Based upon his bequest share α_k, sibling k decides two things: what direction d to transfer an amount t—to the bequest pool ($d_k = B$) or from the bequest pool ($d_k = G$)—and how much to spend e_k on winning the right to transfer t. A sibling seeking to transfer to the bequest pool will be called a *B-seeker,* and a sibling seeking to transfer to his gift account will be called a *G-seeker*. The total number of B-seekers will be denoted n and the total number of G-seekers will be denoted m. Thus, $N = n + m$. Finally, let the siblings be ordered so that siblings 1 through n are B-seekers and siblings $n+1$ through $n+m$ are G-seekers.

Setting the size of the transfer t equal to 1, three outcomes are possible for each sibling: each B-seeker i receives α_i if he wins; $\alpha_i - c$ if another B-seeker sibling wins; and $-\alpha_i$ if a G-seeker wins, where $c = 1/(N-1)$, the reduction in the gift pool to non-winning B-seekers. Each G-seeker j receives $1 - \alpha_j$ if she wins, $-\alpha_j$ if another G-seeker wins, and $\alpha_j - c$ if a B-seeker wins. Each sibling k spends an amount e_k to win the game and earn the right to transfer t. The probability of sibling k winning the right to transfer is $P_k = e_k/E$, where E equals the sum of all rent-seeking expenditures. All siblings are risk-neutral and choose e to maximize the expected net payoffs.

The expected payoffs net of rent-seeking expenditures for B-seeker i are

$$\Pi_i(n,m) = P_i\alpha_i + (\alpha_i - c)\sum_{\substack{b=1,\\ b\neq i}}^{n} P_b - \alpha_i \sum_{g=n+1}^{n+m} P_g - e_i, \quad i = 1, \dots, n; \tag{1}$$

N is the number of rent-seekers. We will see later that in our fixed-share model total expenditures are less than in the variable share game.

and for a G-seeker j are

$$\Pi_j(n,m) = P_j(1-\alpha_j) + (\alpha_j - c)\sum_{b=1}^{n} P_b - \alpha_j \sum_{\substack{g=n+1,\\ g\neq j}}^{n+m} P_g - e_j, \quad j = n+1,\dots,n+m. \tag{2}$$

The first term in each expression is the expected gross gain from winning, and the second and third terms are the expected return if some other sibling, a B-seeker or a G-seeker, wins.

An equilibrium (best-response) bid for sibling k is a non-negative amount e_k^*, given n, m and a vector of bids of the other $N-1$ siblings $\boldsymbol{e}_{-k}$, such that

$$\Pi_k(e_k, \boldsymbol{e}_{-k}, n, m) \leq \Pi_k(e_k^*, \boldsymbol{e}_{-k}, n, m).$$

Equilibrium bids in the children's sub-game depend on the vector of bequest shares $\boldsymbol{\alpha}$ and the vector of directional choices $\mathbf{d}$. A solution to the bequest game is a directional choice d_k^* and corresponding equilibrium bid $e_k^*(\boldsymbol{\alpha}, d_k, \boldsymbol{d}_{-k}^*)$, from each sibling k, such that

$$\Pi_k(e_k^*(\boldsymbol{\alpha}, d_k, \boldsymbol{d}_{-k}*), \boldsymbol{e}_{-k}^*) \leq \Pi_k(e_k^*(\boldsymbol{\alpha}, d_k^*, \boldsymbol{d}_{-k}^*), \boldsymbol{e}_{-k}^*),$$

where $\mathbf{d}_{-k}^*$ is the vector of equilibrium directions from all siblings except k.

The Kuhn-Tucker conditions for maximizing expected net payoffs for a B-seeker are

$$2\alpha_i S^G + cS_{-i}^B \leq E^2, \tag{3a}$$

$$(2\alpha_i S^G + cS_{-i}^B - E^2)e_i = 0, e_i \geq 0; \quad i = 1,\dots,n; \tag{3b}$$

and for a G-seeker are

$$S^B(1+c-2\alpha_j) + S_{-j}^G \leq E^2, \tag{4a}$$

$$(S^B(1+c-2\alpha_j) + S_{-j}^G - E^2)e_j = 0, e_j \geq 0; \quad j = n+1,\dots,n+m; \tag{4b}$$

where E equals the sum of the bids from all siblings, S^B equals the sum of the bids from the n B-seekers, and S_{-i}^B equals the sum of the bids of the $(n-1)$ B-seekers excluding sibling i. S^G and S_{-j}^G are defined analogously for G-seekers.

In the general case, with any number of B-seekers and G-seekers, the $2(n+m)$ Kuhn-Tucker conditions can be solved for the equilibrium aggregate rent-seeking expenditure, e_k^*, of each sibling k as a function of the vector of bequest shares $\boldsymbol{\alpha}$ and the number of B-seekers and G-seekers, or $e_k^*(\boldsymbol{\alpha}, n, m)$. The total equilibrium expenditure on rent-seeking, $E^*(\boldsymbol{\alpha}) = e_1^* + \cdots + e_n^* + e_{n+1}^* + \cdots + e_{n+m}^*$, then depends on the vector of directions and bids which in turn depend on the initial assignment of bequest shares $\boldsymbol{\alpha}$. The parents choose the value of $\boldsymbol{\alpha}$ that minimizes $E^*(\boldsymbol{\alpha})$.

Two polar cases for the children's sub-game are where all siblings are B-seekers ($n = N$, $m = 0$) or all are G-seekers ($n = 0$ and $m = N$).

For B-seekers, the solution to the first-order condition given in (3) reduces to

$$S_{-i}^B = E^2, \quad \text{for } i = 1,\dots,N. \tag{3a$'$}$$

Solving (3a$'$) for e yields

$$e^* = 1/N^2 \quad \text{and} \quad E^* = 1/N, \tag{5}$$

and i's expected profit as a B-seeker is

$$\Pi_i^*(N,0) = \alpha_i - (N+1)/N^2. \tag{6}$$

For G-seekers, the first-order condition (4a) reduces to

$$S_{-j}^G = E^2, \quad \text{for } j = 1, \dots, N. \tag{4a$'$}$$

Solving (4a′) yields

$$e^* = (N-1)/N^2 \tag{7}$$

and

$$E^* = (N-1)/N.$$

Sibling j's expected profit as a G-seeker is

$$\Pi_j^*(0,N) = (1 - N^2\alpha_j)/N^2. \tag{8}$$

In both of these cases the optimal expenditure on rent seeking e^* is the same for all siblings, and independent of bequest shares. This independence arises from the fact that all siblings choose the same direction. For example, with all siblings G-seekers, wealth is transferred from the bequest pool no matter who wins, and the amount the winner receives ($t = 1$) does not depend on any sibling's bequest share. Thus, the choice of e depends only on the number of siblings, not their bequest shares. As we will show in the next section, however, the assignment of bequest shares can affect a sibling's directional choice and consequently affect his bid and total rent-seeking costs.

4 Two siblings

Several of our basic results can be illustrated with the case of two siblings. There are three possible directional strategy combinations: both siblings are B-seekers, both are G-seekers, or there is one of each. We will show that if one sibling is favored and the other therefore is not, both siblings choosing the same direction is not an equilibrium outcome to their subgame. In particular, in the case where both siblings act as B-seekers, the favored sibling will do better changing directions, and if both siblings play as G-seekers, the unfavored sibling will do better changing directions. Only if bequest shares are equal can both siblings choosing the same strategy direction (G) be an equilibrium.

Let sibling 1 be a B-seeker and sibling 2 be a G-seeker. The expected net payoffs for the two siblings are

$$P_1\alpha_1 - P_2\alpha_1 - e_1,$$
$$P_1(1-\alpha_2) - P_1(\alpha_2 - 1) - e_{12},$$

where $P_i = e_i/(e_1 + e_2),\ i = 1, 2$. The first-order conditions for an interior maximum are

$$2\alpha_1 e_1 = (e_1 + e_2)^2 \tag{9}$$

and

$$2\alpha_1 e_2 = (e_1 + e_2)^2. \tag{10}$$

Solving (9) and (10) yields:

$$e_1^* = e_2^* = e^* = \alpha_1/2, \tag{11}$$

$$E^* = \alpha_1, \tag{12}$$

$$\Pi_i^*(1, 1) = -\alpha_i/2. \tag{13}$$

Notice that in this case where the two siblings seek to transfer in opposite directions, rent-seeking costs depend on bequest shares. Equation (12) shows that rent-seeking expenditures rise with share of the favored sibling when the siblings choose opposite directions. Intuitively, the reason is that if α_k is greater than one-half, sibling k plays as a B-seeker. As the B-seeker's share increases, the amount each sibling receives if they win, and what each sibling gets if they lose, rises. Winning the competition becomes more valuable and each sibling has an incentive to increase his bid. Thus, aggregate rent-seeking costs rise with the share of the favored sibling.

From this game, the following proposition follows:

Proposition 1 *In the solution to the two-sibling bequest game*:

(i) *siblings choose opposite strategies if one is favored*;
(ii) *aggregate rent-seeking expenditures are minimized when bequest shares are equal*; *and*
(iii) *both siblings make positive rent-seeking expenditures*.

As long as $\alpha_1 > 1/2$, B-seeking is a dominant strategy for sibling 1 because $(\alpha_1 - 3/4)$ and $-\alpha_1/2 > (1/4 - \alpha_1)$ at these bequest shares. Likewise, G-seeking is a dominant strategy for sibling 2 because $(\alpha_1 - 3/4)$ and $-\alpha_1/2 > (\alpha_1 - 3/4)$. (These strategy directions switch when sibling 2 is favored, that is, when $\alpha_1 < 1/2$.) At $\alpha_1 = \alpha_2 = 1/2$ the payoffs to each sibling are identical regardless of the strategy direction chosen. Observing the sibling subgame, parents minimize aggregate rent-seeking expenditures at $1/2$ by setting equal bequest shares $(\alpha_1 = 1/2)$. If one sibling is favored, the siblings will choose opposite strategies, and total rent-seeking expenditures will equal the share for the favored sibling.

Finally, notice from (6), (8), and (13) that expected net payoffs are negative for each sibling. Rent seeking clearly is costly. Given that active participation in the game is negative sum, will siblings choose to participate in the game or might they abstain? Suppose that if sibling k abstains from the competition, he receives his bequest share or gifts but makes no expenditures to influence them. The payoff for the non-competing sibling k is $(\alpha_k - c) = (\alpha_k - 1) = -1/2$, if by abstaining he loses a B-seeker's share, and it is $-\alpha_k = -1/2$ if by abstaining he loses a G-seeker's share. If he competes, his expected payoff is $-1/4$ whether he competes as either a B-seeker or a G-seeker. Therefore, competing is preferable to abstaining.

5 Three siblings

We now examine the game for families with three siblings. There are four combinations of directional strategies: three G-seekers, three B-seekers, one G-seeker and two B-seekers, and two G-seekers and one B-seeker. We will show that equal division is still a solution to the rent-expenditure minimization problem, but that it is not the only solution. Using the results obtained in the preceding section, we set the bequest shares for two of the siblings equal to each other.

The results for the sibling sub-game where all three siblings choose the same directional strategy are derived from (6)–(8) evaluated at $N = 3$. As in the two-sibling case, the equilibrium bids and aggregate expenditure are independent of the distribution of bequest shares when all siblings choose the same directional strategy. Unlike the two-sibling case, however, the expenditure and payoff functions differ for the siblings in the mixed strategy cases. These functions can be derived from the first-order conditions. Details are provided in the Appendix.

As in the two-sibling case, it is optimal for a sibling to choose to be a B-seeker in the sibling sub-game only if the sibling's bequest share is greater $1/2$. Although this result is fully developed in the Appendix, the intuition is straightforward. If a G-seeker switches to playing as a B-seeker, he still faces the same loss as he would have if he continued playing G. However, the amount he would get if he wins is $(1-\alpha_k)$ as a G-seeker and α_k as a B-seeker. Thus, it pays to switch if and only if $\alpha_k > 1-\alpha_k$, or $\alpha_k > 1/2$. Since only one sibling can have a bequest share greater than one-half, there can be only one B-seeker in equilibrium.

With the knowledge of the sibling game, parents choose between setting all shares below $1/2$ with aggregate rent-seeking of $(N-1)/N = 2/3$ and setting one sibling's share above $1/2$ with aggregate rent-seeking expenditures of $(2\alpha_1 + 1)/3$. For all values of $\alpha_1 > 1/2$, total expenditures in the mixed-strategy case exceed 2/3, so that rent-seeking expenditures are minimized by setting $\alpha_1 < 1/2$ for all siblings. As we noted at the outset of this section, this solution includes equal bequest shares ($\alpha_{1,2,3} = 1/3$), but also includes any combination where all shares are less than $1/2$ because rent-seeking expenditures are independent of shares. If parents fail to minimize rent-seeking expenditures and set any sibling's share above $1/2$, then total rent-seeking expenditures rise with the bequest share of the B-seeker.

6 *N* siblings

In the two-sibling and three-sibling cases the bequest-gift game contains at most one B-seeker, and any B-seeking sibling will have a bequest share greater than $1/2$. In the three-sibling case, if no sibling's share is greater than $1/2$, all siblings are G-seekers. Here, we assume that this result holds for any number of siblings.[6] Assuming an interior solution, the first-order conditions given in (3) and (4) hold as equalities. Solving these conditions for the equilibrium rent-seeking expenditure for the case with one B-seeker (with $\alpha_1 > 1/2$) and $N-1$ G-seekers yields:

$$e_1^* = [(N-2) + 2\alpha_1][2(N-1)\alpha_1 - (N-2)]/2N^2\alpha_1, \tag{14}$$

and

$$\sum_{j=2}^{N} e_j^* = [(N-2) + 2\alpha_1]\left[N - 2\sum_{j=2}^{N}\alpha_j\right]\Big/ 2N^2\alpha_1. \tag{15}$$

Total rent-seeking expenditures are

$$E^* = \sum_{k=1}^{N} e_k^* = [(N-2) + 2\alpha_1]/N. \tag{16}$$

[6] Although the problem is not analytically tractable, numerical analyses support this assumption.

As a sidebar on rent seeking in the sub-game where parents may not minimize aggregate expenditures, $\partial E^*/\partial\alpha_1 = 2/N > 0$ and $\partial E^*/\partial N = 2(1-\alpha_1)/N^2 > 0$. Aggregate rent-seeking costs increase with the share of the B-seeker and with the number of siblings. Also, as N gets large, total expenditures approach 1—the amount available for transfer.

As for the solution to the parental minimization problem, the N-sibling case mirrors the three-sibling outcome. In the case where bequest shares are less than $1/2$ for all siblings, from (7), total rent-seeking expenditures equal $(N-1)/N$. The expenditures given by (16) are larger than those in (7) for any values of $\alpha_1 > 1/2$. Therefore, parents minimize rent-seeking by setting all shares less than $1/2$.

These results lead to the following proposition:

Proposition 2 *With any number of siblings*,

(i) *at most one sibling will seek to transfer assets to the bequest pool under any bequest distribution plan*;
(ii) *aggregate rent-seeking expenditures are minimized when no sibling receives more than* $1/2$ *of the total bequest*; *and*
(iii) *if parents do not minimize rent-seeking and set a sibling's share greater than* $1/2$, *aggregate rent-seeking expenditures rise with the number of siblings and in the limit equal the value of the transfer.*

7 Discussion

A direct implication of Proposition 2 is that there is room for parents to favor some of their children over others, but there is an upper limit on how much they can favor one child without bearing higher rent-seeking costs.[7] If parents preferred, for some reason, to give some of their children bequest shares that are greater than their *pro rata* share, they could do so without an increase in rent seeking costs as long as each favored child receives no more than 50% of the estate. Similarly, in situations where assets are in-kind or illiquid—real property, for example—parents could choose an unequal division of assets without encouraging more rent-seeking activity.

We do not model the gift-giving process or how parents decide how much to bestow on their children in terms of *inter vivos* transfers. We suspect that large portions of parental gifts are doled out on a perceived "need" basis, and that sibling rivalry is minimal. Furthermore, locking into a particular gift distribution rule with fixed shares would likely run counter to parental desires to benefit their children. But, there are other gifts that may be considered "discretionary" by the children. We assume that children see a private return in lobbying for such discretionary gifts, even if it reduces their bequest or lobbying against discretionary gifts to their siblings because of the impact on their bequest.

If parents are altruistically motivated, they will choose the rule that maximizes net bequests. If parents are not altruistic, bequests can be rationalized as a kind of exchange between parents and their offspring (Bernheim et al. 1985). Parents threaten to transfer bequests away from any child that fails to engage in a valued activity (like visiting or phoning their parents on holidays) in favor of those children who do. In our game the expenditure level e can be interpreted as non-productive expenditures to discredit or sabotage another

[7] Proposition 2 also implies that parents can *disfavor* a child or subset of their children, leaving them with very small shares, without affecting total rent-seeking expenditures.

child's transactions with their parents.[8] Since rent-seeking expenditures reduce the total surplus of the set of parent-child exchanges, and assuming that parents are the superior bargainers and get the lion's share of the surplus, parents would seek to minimize their children's rent seeking. Thus, our simple game applies here as well as when parents are altruistic.

If parents benefit from the rent-seeking activities of their children, then parents would face an incentive to increase sibling competition by increasing the inequality of bequest shares. As long as parents also care about net transfers of a fixed amount of wealth to children, a tradeoff would exist between the gains from more rent seeking and the losses from reduced wealth so that parents would stop short of giving all of their estate to one child.[9]

Buchanan (1983) suggests that adopting a non-discretionary inheritance norm such as primogeniture would reduce sibling rent seeking. Because the bequest-gift game provides an avenue for rent-seeking even where bequest shares are fixed and known, primogeniture may well increase total costs.

8 Concluding remarks

That children compete with each other for family rents is obvious to any parent. And it is equally obvious that rent seeking is costly to parents as evidenced by the amount of resources (time and effort) that parents spend training their children to share and be considerate of their siblings. Further, parents need not be alive when the rent seeking occurs. They may simply foresee the legal battles that would ensue if their estate division was overly skewed in favor of one child.[10] Our contribution in this paper is to show that parental desire to control sibling competition helps to explain the prevalence of equal division of estates. Our main result is that parental attempts to avoid costly rent seeking create a bias toward equal division of bequests. This result is tempered, of course, by the specific way in our model in which siblings are assumed to compete for transfers.

Our model does not contradict the other models of bequest behavior. Nor do we claim that parents necessarily try to equalize all of their intergenerational transfers—bequests and *inter vivos* gifts—among their children. Rather, our result adds additional theoretical support to the empirical finding of equal division of bequests. In fact, as we have shown, equal sharing is not the unique rent-seeking outcome when the number of siblings exceeds two. Some other reason—fairness, ease of computation, concern over children's feelings, or other factors discussed in the literature—is required to get equal sharing as a unique outcome.

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[8]For example, one child might try to convince his parents that the other children are engaging in undesirable behavior, or are not well-intentioned.

[9]In this case, any gross benefits the parents receive from the children's rent-seeking activity would have to be netted out of E before making comparisons with the total rent-seeking costs in the model presented in the text.

[10]It is interesting to note that in the United States, at least, the courts typically impose an equal-division rule when an estate in left intestate.

Appendix

In Part I of this appendix we derive the solution to the general case of one B-seeker and $N-1$ G-seekers. In Part II, we show that one B-seeker is the solution for a bequest share above $1/2$, and all G-seekers is the solution with all bequest shares below $1/2$.

A.1 General solutions

Adding up the n first-order conditions for the B-seekers, and the m first-order conditions for the G-seekers yields:

$$c(n-1)e_i + 2\alpha_i e_j m = (ne_i + me_j)^2 \tag{A.1}$$

and

$$ne_i(1+c-2\alpha_j) + (m-1)e_j = (ne_i + me_j)^2, \tag{A.2}$$

where $E = (ne_i + me_j)$ is the sum of the bids from all siblings, ne_i is the sum of the bids of n B-seekers (S^B), me_j is the sum of the bids of the m G-seekers (S^G), $ne_i + me_j = 1$, and $c = 1/(m+n-1)$.

Assuming an interior solution exists, we can solve for E^*:

$$E^* = \frac{\alpha_i[2m^2n(1+c) - 4mn(1-\alpha_i) - cmn(n-1)(m-1)}{[2(m+n)\alpha_i + mc - n]mn}. \tag{A.3}$$

Setting $n = 1$ in (A.3), and noting that $m + n = N$, yields (16) in the text.

A.2 Details on three-sibling solutions

Three B-seekers $(3, 0)$:

$$\begin{aligned} &e^* = 2/9 \\ &\Pi^*_{1,2,3}(3,0) = \alpha_i - 4/9 \\ &E^* = 2/3. \end{aligned} \tag{A.4}$$

Three G-seekers $(0, 3)$:

$$\begin{aligned} &e^* = (N-1)/N^2 = 2/9 \\ &\Pi^*_{j1,2,3}(0,3) = 1/9 - \alpha_i \\ &E^* = 2/3. \end{aligned} \tag{A.5}$$

One B-seeker and two G-seekers $(1, 2)$:

$$\begin{aligned} &e_i = 1/18(8\alpha_i - 1/\alpha_i + 2); \qquad e_j = e_i(1+2\alpha_i)/(8\alpha_i - 2); \\ &\Pi_1(1,2) = (1 - 8\alpha_1 - 2\alpha_1^2)/18\alpha_1; \qquad \Pi^*_{2,3}(1,2) = 8\alpha_1(2 - 10\alpha_1 - 1\alpha_1)/36; \\ &E^* = (2\alpha_1 + 1)/3. \end{aligned} \tag{A.6}$$

Two B-seekers and one G-seeker $(2, 1)$:

$$\begin{aligned} &e_i = 16\alpha_1^2/(72\alpha_1 - 9); \qquad e_j = e_i(16\alpha_1 - 3)/4\alpha_1; \\ &\Pi^*_1(2,1) = \alpha_1(3 - 40\alpha_1)/(72\alpha_1 - 9); \qquad \Pi^*_{2,3}(2,1) = 2\alpha_1(8\alpha_1 - 3)/(72\alpha_1 - 9); \\ &E^* = (4\alpha_1)/3. \end{aligned} \tag{A.7}$$

For siblings 2 and 3, $\Pi_{2,3}(1,2) > \Pi_{2,3}(0,3)$ and $\Pi_{2,3}(0,3) > \Pi_{2,3}(1,2)$ for all α_1 between $(0,1)$, so G is the dominant strategy for 2 and 3. For sibling 1, $\Pi_1(1,2) > \Pi_1(3,0)$ and $\Pi_1(3,0) > \Pi_1(1,2)$ as long as $\alpha > 1/2$, so B is a dominant strategy for this sibling at these bequest shares. For $\alpha_1 < 1/2$, $\Pi_1(0,3) > \Pi_1(1,2)$ so all three siblings' best payoff is G for these values of $\alpha_1 < 1/2$. Numerical analysis confirms the algebraic conclusions.

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