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ORIGINAL PAPER

Strategic altruistic transfers and rent seeking within the family

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Abstract This paper examines the rent-seeking behavior of "selfish" children in competing for parental transfers. The paper extends Chang and Weisman (South Econ J 71:821–836, 2005), that focuses on compensated transfers, to allow for *non-compensated* transfers à la Buchanan (J Law Econ 26:71–85, 1983) and derives results for the case in which children's time contributions as perceived by their parents are a merit good (e.g., service), pure waste (e.g., bugging), or a mix of both. For an increase in the proportion of time contributions that are pure waste, parents find it optimal to reduce the size of an overall transfer, thereby lowering the levels of wasteful rent-seeking activities by their children within the family.

Keywords Strategic altruism · Parental transfers · Sibling rivalry · Rent seeking

JEL Classification D1 · C7

1 Introduction

Conflict and sibling rivalry within the family have been observed as an imperative factor in influencing the intergenerational behavior. On the first page of his seminal book, *A Treatise on the Family*, Becker (1981, 1991) remarks that "Conflict between the generations has become more open, and parents are now less confident that they can guide the behavior of their

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children." In his interesting book, *Envy: A Theory of Social Behavior*, Schoeck (1987) considers sibling rivalry as a frequently observed behavior of envy within the family. Despite these observations, relatively little theoretical research has been conducted to explicitly characterize the roles that family conflict and sibling competition play in affecting financial transfers from parents to their children. Most theoretical models of transfers assume harmonious parental-children relationships without explicitly spelling out intergenerational conflict and intra-generational interaction in a non-cooperative Nash (i.e., in an independent decision-making) manner.

The first strand of the literature on intergenerational transfers (Becker 1974, 1981; Barro 1974; Becker and Tomes 1979; Tomes 1981) stresses the importance of parental altruism in determining the intra-family allocation of resources. Family head is theorized as a "benevolent dictator," and children are taken to be "rotten" in decision-making so that their preferences have no bearing on family decisions. Given that the altruist models of transfers do not allow for children-supplied merit goods (Becker 1991, p. 10), sibling competition for resources plays little or no role in affecting parents' transfers to children. The pure altruism models predict that parental transfers are compensatory in that more resources are transferred to the children with lower earnings.

The second strand of the literature on intergenerational transfers further allows for family-specific merit goods (e.g., service and companionship) that children supply to their parents. The models of Bernheim et al. (1985) and Cox (1987) consider parental transfers as an exchange between parents and children for services rendered by the children. Pollak (1988) proposes the notion of "tied transfers" in that parents-to-children transfers are tied to the children's consumption of particular goods or services that the parents value. Kotlikoff and Morris (1989) and Cox and Rank (1992) contend that parental transfers can be interpreted as a means of "payment" for services put forth by a child. Empirical studies of private income transfers and strategic exchange show that there is a positive relationship between a child's earnings and the transferred amount when his parents' price elasticity of demand for the services of the child is low. This second strand of the literature, however, does not explicitly consider how parent–child conflict and sibling interactions affect parental transfers.[1]

[1]There are some exceptions. Stark and Zhang (2002) consider inter-sibling interaction and show that a positive transfer–earnings relationship is counter-compensatory which, rather than being orthogonal to parental altruism, originates from such altruism. Engers and Stern (2002) examine long-term care and family bargaining. For empirical studies that examine issues related to inter-sibling interaction in providing long-term care to elderly parents and intra-family allocation of resources, see Bommier and Eckhardt (1998), Hiedemann and Stern (1999), Pezzin and Schone (1997, 1999, 2002), Checkovich and Stern (2002), and Schoeni (2003). I thank an anonymous referee for drawing my attention to these important contributions. The present paper departs from these contributions in some important aspects. This paper pays particular attention to (1) elements of conflict or non-cooperation in parental-children interactions, (2) differences in compensated and non-compensated transfers, and (3) issues related to socially desirable or undesirable rent seeking by children in a Nash game.

Going beyond the dichotomy of altruistic and exchange motives, Cox (2003) emphasizes the importance of *conflict* in the economic analyses of family behavior and transfers. Cox states:

> "The altruism versus exchange framework has caught on in empirical literature because it seems to cover the bases: I give you something either because I care about you or because I want something in return, or both. *This ignores a third possibility: Maybe I just want you to stop bugging me.* (Italics added) At first, this alternative looks like exchange, but it is not. My disabled father yells; I change his blankets.... Yelling is not Pareto optimal; neither is wheedling, nagging, cajoling, or any of the other seven deadly sins of family conflict. Such episodes are wasteful, like strikes or wars.... Such waste makes conflict difficult to analyze in economic terms" (p. 192).

This third possibility concerning the effect of parent–child conflict on transfer motives and decisions parallels the Buchanan (1983) notion of *non-compensated* transfers. Further stressing sibling rivalry for family resources, Buchanan states:

> "In a broad and very general sense, the resource-wasting struggles for access to noncompensated transfers of value (and power) have long been recognized. For example, quasi-economic arguments have been made for hereditary succession and tragically wasteful conflict for highly valued prizes have long been the stuff of classic fiction. Nonetheless, a more explicit analysis that takes rent-seeking behavior as its central organizing element seems to be warranted." (pp. 71–72)

Notwithstanding the seminal work of Buchanan more than two decades ago, relatively little attention has been paid to linking the motives and determinants of family transfers to parental-children conflicts and rent-seeking behavior by children. In Buchanan (1983), parents and children are implicitly or explicitly treated as "interest groups" (i.e., beneficiaries) within the family where there involves transfer of value (pecuniary or non-pecuniary) among family members. As such, intergenerational conflict and intra-generational rivalry are unavoidable. Parents wish to enjoy family-specific merit goods such as attention and care uniquely provided by their children. Financial resources that parents make to their children in exchange for merit goods constitute an important non-market transfer of value within the family. Children may compete in a non-cooperative manner for valued properties from their parents. In a family with multiple children, one would expect not only intergenerational interactions between parents and children, but also intra-generational interactions between the children. It is interesting to analyze issues related to strategic altruism, sibling competition for parental transfers, and intergenerational exchange from the perspectives of rent seeking. Faith and Tollison (2001), Chang and Weisman (2005), and Chang (2007) further examine different dimensions of sibling rivalry for family resources (gifts or bequests) by using

a *rent-seeking* approach.[2] In the two-sibling model of Chang and Weisman, however, transfers are assumed to be "compensated" in that parents consider time contributions by their children as valuable economic goods. That is, children's transfer-seeking activities are taken to be "socially desirable" within the family. This approach ignores the possibility of "resource-wasting struggles for access to non-compensated transfers" (Buchanan 1983). In other words, Chang and Weisman (2005) assume away the portions of children's time contributions that are considered by parents as pure waste (e.g., bugging).

The purpose of this paper is to examine the rent-seeking behavior of "selfish" children for parental transfers when (1) such transfers are non-compensated and generate socially undesirable or wasteful rent seeking à la Buchanan (1983) and (2) parental-children relationships may involve elements of non-cooperation or conflict as addressed by Cox (2003). Extending Chang and Weisman (2005), the analysis with the present paper allows for alternative scenarios in terms of whether children's time contributions are perceived by their parents as a merit good, pure waste, or a mix of both. Specifically, we wish to present a theoretical framework that is capable of analyzing how both non-compensated and compensated transfers are related to children's rent-seeking incentives for family resources. It is widely recognized that rent seeking refers to activity that is either desirable or undesirable from the perspective of a society. Socially undesirable rent seeking refers to an activity that seeks to obtain a transfer of value without offering anything in return to the agent making the transfer. In other words, there is a non-compensated transfer that is directly related to socially undesirable or wasteful rent seeking. It is instructive to investigate, from the perspective of rational choice, how altruistic parents optimally adjust their financial transfers in response to whether the transfers lead to desirable or undesirable rent seeking by their children.

In the analysis, we discuss differences in implications for non-compensated transfers versus compensated transfers resulting from differences in children's behavior perceived by their parents. We further examine how the number of children in a family affects (1) the children's time allocations between transfer-seeking activities and labor market activities and (2) their parents' optimal decision on making a financial transfer to the children. Unlike a typical rent-seeking model in which the value of a contested object is exogenously given, the total transfer amount that parents commit to their children in our two-stage Nash game is determined endogenously. We find that rent seeking is financially attractive to the competing children. Furthermore, we show that for an increase in the proportion of children's time contributions which are pure waste, parents find it optimal to strategically increase their own consumption and decrease the size of an overall transfer or bequest, thereby reducing the levels of wasteful rent-seeking activities by their children.

[2] I thank James Buchanan who, in a personal correspondence, links the sibling rivalry model of Chang and Weisman (2005) to his classic 1983 paper on non-compensated transfers and rules of succession, viewed from the perspective of rent seeking.

The remainder of the paper is structured as follows. Section 2 presents a rent-seeking framework of sibling competition for parental transfers in a Nash game. In Section 3, we analyze the cases of non-compensated versus compensated transfers and then examine their differences in implications for rent-seeking behavior within the family. Section 4 discusses policy implications of the model for government's intergenerational income redistribution. Section 5 concludes.

2 A two-stage Nash game and children's decisions on rent seeking

Consider a family in which $N(\geq 2)$ selfish adult children compete in acquiring financial transfers from their altruistic parents.[3] The parents have a total amount of M dollars (the "prize") to distribute to the children. Let t_i denote the amount of time that child $i(i = 1, \ldots, N)$ allocates to transfer-seeking activities within the family. For child i, the share of the prize M is specified as

$$h_i(t_1, \ldots, t_N) = \frac{t_i}{t_i + t_{-i}}, \tag{1}$$

where $t_{-i} = \sum_{k}^{N} t_k$, $k = 1, \ldots, N$ and $k \neq i$.

Equation 1 is a "contest success function" (CSF) widely used in the rent-seeking and conflict literatures as a mechanism for distributing a contested object.[4] According to the CSF, child i's share of the prize, M, depends positively on his time contribution, t_i, and negatively on the time contributions of other siblings, t_{-i}. It is easy to verify that the marginal effect of t_i on h_i, $h_i' \equiv \partial h_i / \partial t_i = t_{-i} / (t_i + t_{-i})^2$, is positive but is subject to diminishing returns.

Theoretical models of private intergenerational transfers frequently focus on the case of families with a single child. Bernheim et al. (1985) indicate that a testator with a single beneficiary is constrained by "considerations of credibility" because the testator cannot "credibly threaten universal disinheritance" (p. 1046). The authors further suggest that "as long as there are two credible beneficiaries, it is possible for the testator to devise a simple, intuitively appealing bequest rule that overcomes the problems of credibility" (p. 1046).

[3] Becker (1993, p. 398) remarks that "most parents believe that the best example of selfish beneficiaries and altruistic benefactors is selfish children with altruistic parents." As in the family economics literature, children are assumed to be selfish in that they only care about the well-being of their own.

[4] Skaperdas (1996) presents axiomatic characterizations of various forms of contest success functions. The additive form of contest success function has been widely employed to examine various issues such as those on rent seeking and lobbying, tournaments and labor contracts, political conflict, war and peace, and sibling rivalry. See, e.g., Tullock (1980), Lazear and Rosen (1981), Hirshleifer (1989), Grossman (2004), Chang and Weisman (2005), Garfinkel and Skaperdas (2006), Chang et al. (2007a, b), and Chang (2007). Konrad (2007) presents a systematic review of applications in economics and other fields that use CSFs similar to those in Eq. 1.

The multiple-sibling model developed in this paper is consistent with these suggestions. To deal with the credibility problems, we examine the scenario in which altruistic parents strategically orchestrate a transfer-seeking contest among their children. One objective of the contest is to induce the children to supply family-specific merit goods such as companionship, attention, or care. The other objective is to use the contest as a mechanism for distributing financial resources among the children. We will show that each child has a financial incentive to participate in the contest.

Following Chang and Weisman (2005), we employ a two-stage, non-cooperative Nash game to characterize the endogeneity of parental-children interactions. These endogenous interactions are captured by the children's time contributions and the parents' financial transfers. The timing of the game is as follows. In the first stage, the parents commit a specified amount of money that will be distributed to their children according to the CSF discussed above. It is assumed that the parents credibly commit not to reverse their decision. In the second stage, the children compete for transfers by simultaneously and non-cooperatively choosing the amounts of time contributions that maximize their respective objective functions. The parents do not distribute the prize M until after their children have expended time with them, that is, until after each child's transfer share has been realized. This two-stage approach parallels the idea that Hirshleifer (1977) stressed: parents have the "last word."[5]

As with a standard rent-seeking game, we assume that information is common knowledge to all parties. Also from game theory, we use backward induction to solve for the sub-game perfect Nash equilibrium in the two-stage game. Consistent with backward induction, we first solve for the children's equilibrium choices of time allocation, given the CSF and the prize M for the contest. We then solve for the optimal consumption and transfer decisions of the parents in the first stage of the game. Given that the non-cooperative Nash equilibrium is derived under the condition that each player's choice is a "best response" to the choice of other players, the sub-game perfect Nash equilibrium is self-enforcing in nature.[6]

We assume that each child is risk neutral and has E units of time available for working outside of the family and for rent-seeking activities (by providing services to his parents, or simply "lobbying" for a transfer, or a mix of both). Earning capability of each child is captured by the wage rate that he commands in the labor market. Let the market wage rate for child i be $w_i > 0$.

[5]Hirshleifer (1977) argues the importance of parents' "last word" in decision-making to discipline "rotten" kids as discussed by Becker (1974). Bergstrom (1989) further proposes the use of a two-stage, non-cooperative Nash game to deal with the "Rotten Kids Theorem" of Becker and to examine parental-children interactions. Manski (2000) points out that the use of non-cooperative game theory as a set of tools for the study of market and non-market interactions in microeconomics may be the "defining event of the late twentieth century" (p. 116).

[6]Alternative approaches include the use of a cooperative game or a bargaining game. Nevertheless, these two games generally require a well-defined mechanism for "contract" enforcement because there is no endogenously determined incentive mechanism to move to the cooperative outcome or the bargaining solution.

Given that the parents determine M, the children in the second stage of the game simultaneously and non-cooperatively choose their time allocations to maximize their respective incomes, which are given by

$$Y_i = (E - t_i)\, w_i + h_i M - \theta t_i - \tau, \tag{2}$$

where the transfer share h_i is determined by the CSF in (1), θ is a monetary measure of disutility involved in spending time with the parents,[7] and τ is a lump-sum income tax imposed by the government. The first-order condition (FOC) for child i is

$$\frac{\partial Y_i}{\partial t_i} = \frac{t_{-i}}{(t_i + t_{-i})^2} M - w_i - \theta = 0, \tag{3}$$

where $t_{-i} = \sum_{k}^{N} t_k$, $k = 1, \ldots, N$ for $k \neq i$ and $i = 1, \ldots, N$. The FOC indicates that each child optimally chooses his time contribution up to the level where $h_i' M = w + \theta$, i.e., the expected marginal benefit of exerting one more unit of time for rent seeking equals the child's opportunity cost of time (in terms of wage income forgone plus the disutility term). The second-order conditions for a maximum are satisfied because of the strict concavity of the CSFs.

In the rent-seeking and conflict literatures, it is frequently assumed that rent seekers are homogeneous when analyzing what effect the number of contestants has on an equilibrium outcome. We follow this approach by assuming that children as transfer seekers are homogeneous and their earning capabilities are identical. That is, $w_i = w_j = w$ for $i \neq j, i = 1, \ldots N$, and $j = 1 \ldots N$. This assumption implies a symmetric equilibrium in the Nash game so that $t_i = t_j = t$. It follows from the FOC in (3) that

$$\frac{(N-1)\, t}{(Nt)^2} M - w - \theta = 0. \tag{4}$$

Solving for time contribution by each child yields

$$t = \frac{(N-1)\, M}{N^2 (w + \theta)}. \tag{5}$$

Total investment in rent seeking by all the children can be measured by the total amount of time contributions they expend,

$$Nt = \frac{(N-1)\, M}{N (w + \theta)}. \tag{6}$$

It follows immediately that

$$\frac{\partial t}{\partial M} > 0; \quad \frac{\partial (Nt)}{\partial M} > 0. \tag{7}$$

[7] We follow Cox (1987) and assume that there is a disutility to the selfish children when they spend time with their parents.

To determine the children's participation incentives in rent seeking, we compare post-transfer income (when $M>0$) to pre-transfer income (when $M=0$). Substituting the optimal amount of time t from (5) into Y_i in (1) yields each child's post-transfer income,

$$Y_i = Ew + \frac{M}{N^2} - \tau. \tag{8}$$

Equation 8 implies that the participation incentive constraint is satisfied in that the difference between the post-transfer income and the pre-transfer income is strictly positive for $M > 0$.[8] It also follows from (8) that, *ceteris paribus*, a child's post-transfer income decreases with the number of children, increases with the market wage rate, and increases with the size of parental transfers given to all children.

These findings lead us to establish the following proposition:

Proposition 1 *In a two-stage, non-cooperative Nash game in which* $N(\geq 2)$ *homogeneous children compete for a financial transfer from their parents according to the contest success function in* (1)*, we have the following:*

(a) *Both an individual child's rent-seeking effort* (*i.e., time contribution to the parents*) *and the children's aggregate rent-seeking effort increase with the total transfer amount, M, and decrease with the earning capability of a child* (*as measured by his market wage rate, w*).

(b) *For* $M > 0$*, each child's post-transfer income is unambiguously higher than his pre-transfer income. This implies that the children have a financial incentive to participate in rent seeking for parental transfers.*

3 Parents' decisions on transfers: non-compensated versus compensated

Next, we examine the optimal size of an overall transfer that the parents commit for the rent-seeking contest. In the analysis, we allow for differences in children's behavior in terms of whether rent-seeking time contributions are perceived by their patents as a merit good, pure waste, or a combination of both. Transfers are compensated when time that children spend with their parents is valuable for the parents. In this case, parents enjoy children-provided merit goods (e.g., services) and hence the marginal utility of these goods to the parents is strictly positive. Alternatively, transfers are non-compensated when parents do not receive any compensation (in utility term) in return from their children. We further consider the circumstances in which time spent by children with their parents involve both valuable services and pure waste.

[8] I thank an anonymous referee for pointing out a non-negativity constraint concerning the child's utility as discussed in Bernheim et al. (1985), Cox (1987), and Victorio and Arnott (1993). Parallel to the non-negativity constraint discussed in these studies, the present paper examines the "participation incentive constraint" for the existence of a money–services exchange.

To examine compensated and non-compensated transfers, as well as a continuum between the two cases, we present a simple but unified approach as follows. We assume that the parents collectively have the following altruistic function:[9]

$$U = \left[\ln\left(y_p + S - M\right) + \gamma \sum_{i=1}^{N} t_i \right] + \alpha_p \left(\sum_{i=1}^{N} \beta Y_i \right) \tag{9}$$

where y_p is the parents' initial income, S is a lump-sum public transfer such as pension to the parents, γ is the share of time contribution by each child that is actually valuable for the parents,[10] t_i is the amount of time that each child spends with the parents, α_p $(0 < \alpha_p < 1)$ is the altruism coefficient attached to each child's utility, β represents the utility valuation that the parents place on each child's income, and Y_i is post-transfer income of each child as shown in Eq. 8.

We use the parameter γ to capture different types of children's behavior that parents perceive when making a financial transfer to the children. If $\gamma = 1$, this is the case with fully compensated transfers in which children's time contributions are all valuable for the parents. If $\gamma = 0$, this is the case with fully non-compensated transfers in which time spent by children with their parents is completely wasteful. For an intermediate case such that $1 > \gamma > 0$, γ is the share of children's time contributions valuable for the parents and $(1 - \gamma)$ is the share that is pure waste. This approach allows us to derive results for the more general case where children's time contributions to their parents are considered as a merit good, pure waste, or a mix of both.[11] Note that the parents' personal utility, $u^C = \ln\left(y_p + S - M\right) + \gamma \sum_{i=1}^{N} t_i$, is a function of their own consumption on a Hicksian composite good (whose price is normalized to one) and the total amount of time put forth by the children weighted by the behavioral parameter γ.[12] Note also α_p in (9) which implies that the parents are equally altruistic toward their children.

The objective of the parents is to choose M that maximizes the altruistic utility function in (11), given the children's time contributions (see (5)) and

[9] An additively separable utility function has been widely adopted to analyze various issues such as the "rise and fall of families" (Becker and Tomes 1979, 1986), the economic analysis of fertility (Becker and Barro 1988), residential choice of family members (Konrad et al. 2002), and sibling rivalry and parental transfers (Chang and Weisman 2005; Chang 2007). Laferrère and Wolff (2006) present a systematic review of studies that show alternative or more general forms of the utility functions of altruistic parents.

[10] We can incorporate γ into the contest success function in (1) and rewrite it to be $P_i = \gamma t_i / (\gamma t_i + \gamma t_{-i})$, where γt_i is that portion of child i's time contribution which is valuable to the parents. The assumption of symmetry implies that we have the same CSF as that in (1).

[11] I thank an anonymous referee who suggests that a more general approach be developed to include the three possible cases.

[12] Defining post-transfer income as I, where $I = y_p - M$, the parents spend I on a composite good whose price is normalized to one.

their expected post-transfer incomes (see (8)).[13] Substituting (5) and (8) into (9), we derive the FOC for the parents as follows:

$$\frac{\partial U}{\partial M} = -\frac{1}{y_p + S - M} + \frac{(N-1)\gamma}{N(w+\theta)} + \frac{\alpha_p \beta}{N} = 0. \tag{10}$$

Solving the FOC for the sub-game perfect Nash equilibrium transfer yields

$$M^* = y_p + S - \frac{N(w+\theta)}{(N-1)\gamma + \alpha_p \beta (w+\theta)}. \tag{11}$$

Other things (which include w, θ, α_p, β, and N) being equal, the value of M^* is strictly positive if the parents' initial income plus a lump-sum public transfer (e.g., pension) are sufficiently high. That is,

$$M^* > 0 \text{ if } y_p + S > \frac{N(w+\theta)}{(N-1)\gamma + \alpha_p \beta (w+\theta)}. \tag{12}$$

Financial constraints that parents face prevent them from making transfers to their children. This explains why a proportion of families may not transfer financial resources to their children. To examine implications of parental transfer for rent-seeking incentives, we assume that the financial condition in (12) holds.[14] Substituting M^* in (11) into (8) yields the reduced-form solution for each child's equilibrium post-transfer income,

$$Y_K^* = Ew + \frac{1}{N^2}\left[y_p + S - \frac{N(w+\theta)}{(N-1)\gamma + \alpha_p \beta (w+\theta)}\right] - \tau. \tag{13}$$

Using (11) and (13), it is easy to verify the following comparative static results:

$$\frac{\partial M^*}{\partial N} < 0;\ \frac{\partial M^*}{\partial w} < 0;\ \frac{\partial M^*}{\partial \theta} < 0;\ \frac{\partial M^*}{\partial y_p} = \frac{\partial M^*}{\partial S} > 0;\ \frac{\partial M^*}{\partial \alpha_p} > 0. \tag{14a}$$

$$\frac{\partial Y_K^*}{\partial N} < 0;\ \frac{\partial Y_K^*}{\partial w} < 0;\ \frac{\partial Y_K^*}{\partial \theta} < 0;\ \frac{\partial Y_K^*}{\partial y_p} = \frac{\partial Y_K^*}{\partial S} > 0;\ \frac{\partial Y_K^*}{\partial \alpha_p} > 0. \tag{14b}$$

Substituting M^* from (11) into (5) and (6) yields the reduced-form solutions for the equilibrium time contributions by each child and by all the children taken together, which are given respectively as

$$t^* = \frac{(N-1)}{N^2(w+\theta)}\left[y_p + S - \frac{N(w+\theta)}{(N-1)\gamma + \alpha_p \beta (w+\theta)}\right] \tag{15a}$$

[13] Becker (1974) was the first to introduce parental altruistic preferences into the analysis of family economics. Becker (1991, p. 279) further observes that because parents maximize their own utility subject to the family constraints, they may be labeled "selfish," not altruistic, in terms of utility maximization. Pollak (1988) proposes the use of "paternalistic" preferences to replace altruistic preferences in analyzing parent–child relationships and tied transfers.

[14] Bergstrom (1996) presents an excellent review on the economics of the family and explains why, from the perspectives of economics and evolutionary biology, there is a downward transmission of resources from parents to their offspring.

and

$$Nt^* = \frac{(N-1)}{N(w+\theta)}\left[y_p + S - \frac{N(w+\theta)}{(N-1)\gamma + \alpha_p\beta(w+\theta)}\right]. \tag{15b}$$

Using (11) and (15b), we find that

$$\frac{M^*}{Nt^*} = \frac{N}{(N-1)}(w+\theta) > (w+\theta).$$

This implies that the "equilibrium price" of time contribution by each child, $\frac{M^*}{Nt^*}$, is strictly higher than $(w + \theta)$. This result comes as no surprise. When demanding time supplied by their working children, the parents have to offer adequate incentives by paying a price higher than the market wage plus the disutility term (i.e., each child's opportunity cost of time).

Based on (15a) and (15b), we present a comparative static analysis as follows:

$$\frac{\partial t^*}{\partial N} < 0;\ \frac{\partial t^*}{\partial w} < 0;\ \frac{\partial t^*}{\partial \theta} < 0;\ \frac{\partial t^*}{\partial y_p} = \frac{\partial t^*}{\partial S} > 0;\ \frac{\partial t^*}{\partial \alpha_p} > 0;^{15}$$

$$\frac{\partial (Nt^*)}{\partial N} < 0;\ \frac{\partial (Nt^*)}{\partial w} < 0;\ \frac{\partial (Nt^*)}{\partial \theta} < 0;\ \frac{\partial (Nt^*)}{\partial y_p} = \frac{\partial (Nt^*)}{\partial S} > 0;\ \frac{\partial (Nt^*)}{\partial \alpha_p} > 0.$$

These findings result in the following proposition:

Proposition 2 *In a two-stage Nash game where parents commit to make a financial transfer to their children and the children compete for the transfer by expending time with the parents, we have*

(a) *The optimal transfer to all the children decreases with the number of children, the children's earnings capabilities, and each child's disutility involved in spending time with the parents. Nevertheless, the optimal transfer increases with the parents' pre-transfer income, the amount of a public lump-sum subsidy to the parents, and the degree of parental altruism.*
(b) *The comparative static effects of a child's equilibrium post-transfer income mimic those of the optimal transfer.*
(c) *Similarly, the comparative static effects of time contributions by each individual child and by all the children taken together mimic those of the optimal transfer.*

The optimal transfer M^* in (11) includes compensated and non-compensated transfers as two special cases. When $\gamma = 0$, we have the case of a non-compensated transfer (Buchanan 1983). Let such a transfer be denoted

[15] See A-1 in the Appendix for a detailed derivation of the derivatives.

as $\widehat{M}$. When $\gamma = 1$, we have the case of a compensated transfer (Chang and Weisman 2005). Let such a transfer be denoted as $\widetilde{M}$. When $0 < \gamma < 1$, we have a case of "mixed" transfer, which is given by M^*. Based on M^* in (11), we calculate differences in transfer amounts for the alternative cases as follows:

$$\widehat{M} - M^* = -\frac{N(N-1)\gamma}{\alpha_p\beta\left[(N-1)\gamma + \alpha_p\beta(w+\theta)\right]} < 0 \tag{16}$$

and

$$M^* - \widetilde{M} = -\frac{(1-\gamma)N(N-1)(w+\theta)}{\left[(N-1)\gamma + \alpha_p\beta(w+\theta)\right]\left[(N-1) + \alpha_p\beta(w+\theta)\right]} < 0. \tag{17}$$

It follows straightforwardly from (16) and (17) that

$$\widehat{M} < M^* < \widetilde{M}. \tag{18}$$

This indicates that the altruistic parents find it optimal to strategically reduce the size of an overall transfer when their transfer is non-compensated, compared to the case when the transfer is compensated.

Given that the parents' equilibrium consumption is $C_p = y_p + S - M$, it follows from (18) that the corresponding levels of consumption for the three cases are:

$$\widehat{C}_p > C_p^* > \widetilde{C}_p. \tag{19}$$

For intermediate cases with $0 < \gamma < 1$, it is easy to verify from M^* in (11) that the effect of a change in γ on the equilibrium consumption is

$$\frac{\partial C_p^*}{\partial \gamma} = -\frac{\partial M^*}{\partial \gamma} < 0 \text{ since } \frac{\partial M^*}{\partial \gamma} > 0. \tag{20}$$

We thus have

Proposition 3 *For an increase in the proportion of time contributions that are pure waste, parents find it optimal to increase their own consumption and decrease their bequeathed amounts, thereby reducing the levels of socially wasteful rent-seeking activities by their children.*

Proposition 3 indicates that parents who orchestrate a transfer-seeking contest and expect non-pecuniary compensation in return from their children allocate more resources for the contest, as compared to the case when they do not receive any compensation in making a financial transfer. If transfer-seeking activities are deemed to be wasteful from the parents' perspective because their transfers are non-compensated, the size of an overall bequest will be smaller. The intuition behind this result is that wasteful rent seeking will be reduced. Consequently, inefficiencies emerging from the non-compensated

transfer of value properties will be lower. These findings are consistent with the observations by Buchanan (1983, p. 76) that:

> "If … transfers are motivated by donor interests in the prospective utilities of identified recipients, any wasteful rent seeking on the part of those whose utilities are relevant will be undesirable to the prospective donor. *Efforts will be exerted to arrange transfers in such a way as to minimize such rent seeking activities*." (Italics added)

In our analysis, transfers are compensated if they are payments for children-provided services. From the parents' perspective, their children's time is not wasted; it produces something highly valued. Children may value time with their parents. Even if children do not want to be with their parents, they could view parental time analogous to "working," i.e., they are "compensated" for their time. In this case, rent-seeking activities by the siblings are socially desirable. An interesting remark by Buchanan (1983) is as follows:

> "Transfers that take the form of gifts or bequests are, on the surface, non-compensated. Some part of such transfers may, nonetheless, represent payment by the apparent donor for reciprocal services that have been or are to be rendered by the designated donee" (p. 72).

Our analysis further allows for transfers that are non-compensated. As pointed out by Buchanan (1983), "Rent-seeking becomes wasteful only in those situations where those who control access to rents do not or cannot ensure direct compensation" (p. 73).

4 Does Ricardian neutrality hold?

In Sections 2 and 3, we have presented a simple game-theoretic model where two generations are linked by strategically and altruistically motivated parental transfers. It is instructive to examine what policy implications the model has.[16] One issue of interest concerns how parents' transfers and their children's income would change in response to a public policy that redistributes income between the generations.[17] Barro (1974) popularizes the notion of Ricardian neutrality. The seminal work of Becker (1974) is further connected to Barro's model of intergenerational altruism and fiscal policies (Barro 1996, p. 2). Both authors emphasize the role of altruism in affecting parental transfers. Accordingly, redistributive fiscal transfers from children to their parents are shown to be totally inefficient because the altruistic parents adjust their private transfers to the children dollar-for-dollar in reaction to public transfers.

Based on the analytical framework in Sections 2 and 3, we wish to examine the following question: By imposing a lump-sum income tax of one

[16] I thank an anonymous referee who suggests that policy implications of the model be addressed.

[17] Chang and Weisman (2005) do not examine policy implications of their model for government's intergenerational income redistribution.

dollar on children and transferring the taxed dollar to their parents, will the parents make an equivalent amount of a transfer to the children? To answer this question, we derive the so-called transfer-income derivative.[18] Using the parents' optimal transfer equation in (11) and each child's post-transfer income equation in (13), we have

$$\frac{\partial M^*}{\partial S} + \frac{\partial Y_K^*}{\partial \tau} = 0. \tag{21}$$

Equation 21 shows that private transfers undo redistributive public transfers from children to their parents. Consequently, there are no real effects on the family's aggregate income and consumption. This finding confirms the validity of the well-known Ricardian neutrality in intergenerational income redistribution.[19]

It should be noted that parents make financial transfers due to altruistic feelings toward their children. Despite that altruistic parents strategically orchestrate a rent-seeking contest to induce services from their children and that the children behave strategically and non-cooperatively in acquiring transfers from the parents, government's intergenerational redistribution policies remain to be completely neutralized. This suggests that strategic interactions of family members across generations do not constitute sufficient conditions to undermine the theory of Ricardian neutrality. We therefore have

Proposition 4 *Regardless of strategic interactions between altruistic parents and their selfish children in a two-stage, non-cooperative Nash game, Ricardian neutrality continues to hold.*

5 Concluding remarks

Notwithstanding the seminal contribution of Buchanan (1983), relatively few theoretical studies have been conducted in linking the motives and determinants of parental transfers to non-cooperative rent-seeking behavior by children. Faith and Tollison (2001), Chang and Weisman (2005), and Chang (2007) are among some recent studies in this direction. The present study further extends Chang and Weisman (2005), that focuses only on compensated transfers, to allow for non-compensated transfers à la Buchanan (1983) in terms of whether children's time contributions perceived by their parents are a merit good, pure waste, or a mix of both. We discuss implications of differences in children's behavior and transfers for rent-seeking incentives within the family. Moreover, we examine how the number of children affects their time allocation decisions between rent seeking within the family and

[18] See, e.g., Laferrère and Wolff (2006).

[19] Laferrère and Wolff (2006) present a systematic review of papers that lend a support to the Ricardian neutrality proposition (see their Table 4). These papers include Cox (1987), Chami (1996), Sloan et al. (2002), and Villanueva (2001).

working outside of the family as well as altruistic parents' optimal decisions on making a financial transfer.[20] We also discuss implications of the model for government's intergenerational income redistribution policies.

The simple framework of family interactions may offer some unique perspectives linking parents' transfers to their children's earnings and rent-seeking incentives. The model predicts that altruistic parents strategically choose a relatively lower amount of a non-compensated transfer when it generates wasteful rent seeking by their children. In so doing, inefficiencies associated with the non-compensated transfer of valued properties among children are reduced. This downward adjustment in parental transfer in reaction to the nature of rent-seeking activities is not forthcoming in a standard rent-seeking analysis where transfer/rent is exogenous. Two elements thus distinguish this paper from a standard Tullock contest. First, the size of the prize (transfer or bequest) is chosen endogenously by agents who orchestrate the contest. Second, the agents (parents) are altruistic in that they care about the well-being of the contenders (children). The agents' prize does not only cause time contributions which the contenders may enjoy (or not). These contributions are a mixed pleasure or benefit for the altruistic agents. For analyzing inter-sibling rent-seeking behavior and intergenerational conflict within the family, which is arguably the oldest institution for humans, the endogeneity of a contested rent in a two-stage, non-cooperative Nash game appears to be an appealing approach.[21]

Before ending the analysis, it is instructive to note the fact that parental-children conflicts or non-cooperative behavior within the family may influence intergenerational relationships. Incorporating conflict or non-cooperative elements into the economic analyses of the family allows us to go beyond the traditional dichotomy of pure altruism motive versus strategic exchange motive in characterizing parental-children interactions and transfers. This is a potentially interesting direction for future research on family behavior.[22]

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[20] The theoretical model presented in the paper ignores the possibilities of inter-sibling coalition for acquiring more transfers from parents or inter-sibling transfers for providing caregiving to elderly parents. These are interesting and important topics for future research. This paper also abstracts from information asymmetry. See Feinerman and Seiler (2002) for an analysis of parental-children transfers when a parent does not have perfect information about the degree of her children's selfishness. The authors show that both altruism and exchange are important motives under asymmetric information.

[21] See, e.g., Konrad (2007) for a thorough review of studies on strategy in contests and contest design.

[22] Cox (2003) indicates that "conflict … might occupy a significant niche in the familial landscape" (p. 197).

Appendix

A-1. Rewriting the time contribution equation in (15a) yields

$$t^* = \frac{(N-1)\left(y_p + S\right)}{N^2\,(w+\theta)} - \frac{(N-1)}{N\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]}. \tag{22}$$

Taking the partial derivative of t^* in (22) with respect to N, we have

$$\frac{\partial t^*}{\partial N} = \frac{(N-2)\left(y_p + S\right)}{N^3\,(w+\theta)} - \frac{\alpha_p\beta\,(w+\theta) - \gamma\,(N-1)^2}{N^2\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2}. \tag{23}$$

Evaluating the derivative in (23) at the point where $(y_p + S)$ satisfies the financial condition in (12) yields

$$\frac{\partial t^*}{\partial N} = \frac{(N-2)}{N^3\,(w+\theta)}\frac{N\,(w+\theta)}{\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]} - \frac{\alpha_p\beta\,(w+\theta) - \gamma\,(N-1)^2}{N^2[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)]^2}$$

$$= -\frac{(N-1)\left[\alpha_p\beta\,(w+\theta) - \gamma\right]}{N^2\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2} < 0. \tag{24}$$

Next, the partial derivative of t^* in (22) with respect to w is

$$\frac{\partial t^*}{\partial w} = -\frac{(N-1)\left(y_p + S\right)}{N^2\,(w+\theta)^2} + \frac{(N-1)\,\alpha_p\beta}{N\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2}. \tag{25}$$

Evaluating the derivative in (25) at the point where $(y_p + S)$ satisfies the financial condition in (12) yields

$$\frac{\partial t^*}{\partial w} = -\frac{(N-1)}{N^2\,(w+\theta)^2}\frac{N\,(w+\theta)}{\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]} + \frac{(N-1)\,\alpha_p\beta}{N\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2}.$$

$$= -\frac{(N-1)^2\,\gamma}{N\,(w+\theta)\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2} < 0. \tag{26}$$

Similarly, the partial derivative of t^* with respect to θ, when evaluating at the point where $(y_p + S)$ satisfies condition (12), yields

$$\frac{\partial t^*}{\partial \theta} = -\frac{(N-1)^2\,\gamma}{N\,(w+\theta)\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2} < 0. \tag{27}$$

The partial derivatives of t^* in (22) with respect to y_p, S, and α_p are given respectively as

$$\frac{\partial t^*}{\partial y_p} = \frac{\partial t^*}{\partial S} = \frac{(N-1)}{N^2\,(w+\theta)} > 0 \quad \text{and} \quad \frac{\partial t^*}{\partial \alpha_p} = \frac{(N-1)\,(w+\theta)\,\beta}{N\left[(N-1)\,\gamma + \alpha_p\beta\,(w+\theta)\right]^2} > 0. \tag{28}$$

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