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The Rotten Kid Theorem–Entry for the New New Palgrave

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The *Rotten Kid Theorem* was proposed (and named) by Gary Becker in an influential 1974 article [3] and discussed in his book, *A Treatise on the Family* [4]. The theorem claims that if a family has a caring household head who gives money to all other household members, then each member, no matter how selfish, will maximize her own utility by taking actions that lead to maximizing total family income. Thus all kids in the family, even rotten ones, will act harmoniously in the family interest–at least if they know what is good for them.[1]

Here is an informal argument in support of the rotten kid theorem. If, in equilibrium, the household head makes gifts to all kids, then the money available for each kid's consumption is ultimately decided by the head. The post-gift consumption distribution in the family maximizes the head's utility subject to the constraint that family expenditure not exceed family income. Therefore when they take account of gifts from the head, selfish children will be better off, the higher is total family income.

This argument for the rotten kid theorem can be made rigorous with sufficiently strong assumptions about tastes and technology. Consider a family with n selfish "kids" and a household head who cares about the happiness of each kid. Assume that there is just one consumption good. Let x_0 denote the amount of the good consumed by the household head and x_i the amount consumed by kid i. The utility function of each kid i is $u_i(x_i) = x_i$, and the utility function of the household head, $u(x_0, \ldots, x_n)$, is strictly increasing in all the x_i's. Every household member earns some personal income, the amount of which depends on her own actions a_i, but possibly also on the actions of other household members. Let a be the vector of actions

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[1]Becker suggested that this model applies to two-adult families, where one adult has a much higher income than the other. In this case, the other adult is modelled as one of the "kids".

chosen by household members, let $m_i(a)$ be i's personal income, and let $m(a) = \sum m_i(a)$. Feasible allocations must satisfy the household budget constraint, $\sum_i x_i = m(a)$. For any income y, define $(x_0(y), \ldots x_n(y))$ as the allocation that maximizes $u(x_0, \ldots, x_n)$ subject to $\sum_i x_i = y$. Assume that consumption for each i is a *normal good* so that $x_i(y)$ is a strictly increasing function of y. Finally, assume that the household head has personal income large enough so that in equilibrium he chooses to donate money to all other persons in the household. This means that for all feasible a and for each kid, i, $x_i(m(a)) > m_i(a)$. Consider the following two-stage game. In the first stage, household members choose their actions and thus determine total family income $m(a)$. In the second stage the household head finds the allocation $x(m(a))$ that maximizes $u(x_1, \ldots, x_n)$ subject to $\sum_i x_i = m(a)$ and donates $x_i(m(a)) - m_i(a)$ to kid i. In the first stage of the game, each kid realizes that after the head has redistributed income, her own consumption will be $x_i(m(a))$. The normal goods assumption implies that $x_i(m(a))$ is an increasing function of $m(a)$. Therefore the self-interest of each kid coincides with maximizing total family income, $m(a)$.[2]

The trouble with the rotten kid theorem is that it fails to hold in models that make slight concessions toward realism. Bergstrom [7] shows that, in general, the rotten kid theorem fails if kids care about their activities as well as about consumption. For example, if leisure is a complement for consumption, a child can manipulate the parents' transfer in her favor by taking too much leisure. Lindbeck and Weibull [11] and Bruce and Waldman [8] show that the rotten kid theorem fails when individuals can choose between current and future consumption. Lundberg and Pollak [12] show a dramatic failure of the rotten kid theorem when families choose between discrete options like whether to move or whether to have a child.

Bergstrom [7] explored the most general conditions under which a rotten kid theorem can be proved. He showed that in general, a necessary and sufficient condition for the conclusion of the rotten kid theorem to be satisfied is that there is "conditional transferable utility". This means that the utility possibility sets corresponding to all possible activity choices are nested and are bounded above by parallel straight line segments. For example, there is conditional transferable utility if kids care only about their consumption, so that $u_i(x_i, a) = x_i$, and if total family income is $m(a)$. Then the utility possibility frontier conditional on a is the simplex $\{(u_1, \ldots, u_n) | \sum_1^n u_i \leq m(a) \text{ and } u_i \geq 0 \text{ for all } i\}$. In general, however, if

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[2] To ensure that a maximum exists, assume that each m_i is continuous and that each a_i must be chosen from a closed bounded set.

the kids utilities depend on their actions, kids will be able to influence the "slope" of the utility possibility frontier by their choice of actions, a. For example, a selfish kid may benefit by choosing an action that reduces family income but makes it "cheaper" for the parent to invest in her utility rather than that of her sibling. Bergstrom shows that the most general class of environments for which there is conditional transferable utility requires that each kid i has a utility function of the form $u(x_i, a) = A(a)x_i + B_i(a)$ where x_i is i's expenditure on consumer goods and a is the vector of family members' activities. This allows the possibility that activities a_i generate externalities in consumption as well as in income-earning.[3] Then for any a, the upper boundary of the utility possibility set is $\{u | \sum u_i = A(a)m(a) + \sum B_i(a)\}$. If utilities of kids are normal goods for the head, then each kid will maximize her utility by maximizing $F(a) = A(a)m(a) + \sum B_i(a)$. Thus selfish kids would act in the family interest, as the rotten kid theorem asserts.

An interesting debate in evolutionary biology parallels the economists' rotten kid theorem. Alexander [2] maintained that natural selection favors genetic lines in which offspring act so as to maximize family reproductive success. Dawkins [9] disputed Alexander's argument, citing Hamilton's theory of kin selection [10] which implies that in sexual diploid species, offspring value the reproductive success of their siblings at only half of their own. Alexander [1] conceded Dawkins' point, but offered an additional reason that offspring would act in the interest of their parents, "the parent is bigger and stronger than the offspring, hence in a better position to pose its will." Bergstrom and Bergstrom [5] propose an evolutionary model that could support the Becker-Alexander conclusion that children will act in the family interest. They construct a two-locus genetic model, where a gene at one locus controls an animal's behavior when the animal is a juvenile and a gene at the other controls its behavior when it is a parent. Then the frequency of recombination between genes at these two loci determines the evolutionary outcome of parent-offspring conflict. If recombination between these genes is rare, offspring will tend to act in the genetic interest of their parent. If recombination is frequent, there can be an equilibrium where some offspring successfully "blackmail" their parents into giving them more resources than is optimal for the family's reproduction.

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[3]Bergstrom and Cornes [6] show that in a public goods economy, the efficient quantity of public goods is independent of income distribution if and only if preferences can be represented in this form, which is dual to the Gorman polar form for public goods.

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