Externalities to Childbearing
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Introduction
In any family, lower fertility would raise income per family member at least in the short run, since the number of family members to share income would be smaller and reproductive age women might do more market work. Would this higher per capita income justify a government policy to reduce the rate of population growth by lowering fertility? Not necessarily. By choosing to have a child, people express a preference for the child over the additional consumption that would otherwise be possible for family members. However, there may be costs and benefits to the additional child that are not directly born by the decision-making parents, but are rather passed on to other families and to society as a whole. Such consequences, if not mediated by the market, are known as pure or technical “externalities” to childbearing. When they are present, then individually optimal childbearing decisions need not add up to socially optimal fertility. In this case, there is a role for government intervention to influence fertility decisions. In fact, externalities are pervasive in all societies. This article will discuss their sources, their size, and their policy implications.

1. Why Childbearing Externalities Matter
When consequences of childbearing are mediated by the market, they are called pecuniary externalities, as when an additional child reduces the wages of future workers by increasing their number. It has been shown that in this case, socially optimal fertility will not diverge from the individually optimal level (conditional on additional assumptions, and a restrictive concept of social optimality; see Nerlove et al, 1987). Technical externalities do not pass through the market, as would be the case if an additional child meant higher taxes for others, or a bigger hole in the ozone layer.

Economic theory asserts that in the absence of technical externalities, collective welfare will be maximized (in the sense of Pareto optimality) by individuals pursuing their own self-interest in the context of a competitive market (subject to some further conditions). In the presence of technical externalities, this is no longer so. Absent technical externalities, the sum of individually optimal fertility decisions should lead to the same outcome as a collective societal decision about fertility levels. With technical externalities, the outcomes would differ. Thus Garret Hardin, in a famous article on “The Tragedy of the Commons” which first gave this issue prominence, called for "mutual coercion, mutually agreed upon" (1968:p.1247). Subsequent articles by Demeny (1972), Blandy (1974), Ng (1986), Nerlove et al (1987), and Willis (1987) developed the theory from a more rigorous economic standpoint.

Externalities to childbearing are salient in several modern policy contexts, as follows. First, in industrial countries, fertility is on average about 1.5 children per woman, well below replacement level, leading to rapidly aging populations. Why is it so low? When
old age support is provided to elders by their own adult children, this enters a couple’s
cost/benefit calculus and provides an incentive for higher fertility. In industrial countries,
old age support is provided by the younger generations in general through public sector
tax and transfer pension programs, rather than by the elders’ own children. Thus the
creation of public pension programs created a large positive externality to childbearing:
higher fertility is socially beneficial through the pension programs, but this social benefit
does not impinge on individual decisions since it is the general level of fertility that
matters.

Second, in Third World countries, the public sector provides education and health care
for children, so additional children impose tax costs on others, a negative externality.
Governments typically spend little on the elderly in these countries, and also there are few
elderly, so the public costs of children dominate. This gap between the private and social
costs of children is a negative externality that is often taken to justify government
intervention.

Third, in all countries additional children will place additional demands on the
environment, now and in the future, and most environmental amenities (clean air, fresh
water, the ozone layer, climate and CO2 emissions, biodiversity, forest cover) are outside
the market. These negative environmental externalities to childbearing are therefore
potentially very important, particularly in the industrial nations where consumption per
head is greater.

Focusing on just a few issues like these can be misleading. A proper understanding of
childbearing externalities requires a more comprehensive approach.

2. Sources of Externalities

Sources of technical externalities may be grouped into a) common resources or collective
wealth, b) public sector transfers from one age group to another, and c) provision of
public goods or social infrastructure. In addition, there is a wide range of pecuniary
externalities, or which the most important is a potential adverse effect on future wages or
per capita incomes. Each of these three will be briefly discussed, before turning to a
quantitative assessment. The existence and magnitude of externalities depend on
institutional context, in particular on the existence of property rights in resources and on
the size of the public sector. With full property rights and no public sector, most
childbearing externalities would vanish.

2.1 Common Resources or Collective Wealth

The most basic externality to childbearing occurs when an asset is commonly owned and
all members of the population have free access to it. Suppose a group shares a common
pasture for its cows. The larger the group, the fewer cows each will be able to graze
without degrading the pasture and the cows. Each birth increases the size of the group,
but if there are many families, then this diluted effect will not count in the parents’ self-centered cost benefit analysis. Thus there is a negative externality. Fertility will be higher, the group larger, and all worse off than with a collective fertility decision (Hardin, 1968). A similar argument could be made about environmental amenities (water, air, climate, ozone layer, etc.). Nationally owned land, parks, and mineral or fossil fuel deposits can likewise be important sources of negative externalities.

The argument also works in the opposite direction, when collective costs are shared, as with national debt. The US national debt is roughly $20,000 per capita. Additional members of the population due to births or immigration take on a share of this obligation as taxpayers, thereby reducing what must be paid by the balance of the population. This is a positive externality to childbearing.

2.2 Public Sector Inter-Age Transfers
When parents rear their children and thereby transfer income to them, and when adults transfer to their elderly parents, no childbearing externalities to childbearing arise; the need for transfers enters into the fertility decision. When transfers take place through the public sector, however, they do lead to externalities. The most important public transfers in this context are for health, education and pensions.

2.3 Public Goods and Social Infrastructure
The costs of providing a network of roads rises with the size of the population served within a given area, but less than proportionately to the population increase; similarly for communications networks. These are called quasi-public goods. In the limit, there are pure public goods, which by definition cost no more to provide to many people than to few. The leading example is a nation’s military force, which can protect a larger population just as well as a smaller one. Other examples are broadcasting, weather forecasting, and scientific research. Provision of a given level of public goods is cheaper per capita for a larger population, since the tax bill per head will be lower. Public and quasi-public goods give rise to positive externalities to childbearing.

3. Evaluation
The first attempt to evaluate childbearing externalities appears to be Lee (1991). The following discussion will draw on the more comprehensive Lee and Miller (1991), which formed estimates for six Third World countries and the US, for the early to mid 1980s.

Beginning with collective wealth or debt, great variations in natural wealth, particularly for oil in Saudi Arabia and land in Brazil, lead to negative externalities that dominate other sources for these countries. For the US, national debt is an important source of positive externalities, as it would be for many OECD nations. Although an effort was
made to evaluate other items, none appears to be very important. Environmental externalities were not addressed in Lee and Miller, for lack of evidence. Since then, a group of ecologists and economists have estimated the value of all the services provided by natural resources worldwide to fall within the range 16 trillion to 54 trillion dollars per year Roush (1997). The midpoint estimate implies a negative externality of −$175,000 per birth worldwide, very approximately. For most nations, this number would dominate all externalities. Despite the great uncertainty surrounding the calculation, it warns us that environmental externalities can be very large and should not be ignored.

Turn now to public sector transfers, from taxpayers to beneficiaries of various programs. When the direction of transfers is downward, from older to younger ages, as for public education, then incremental births are costly and there is a negative externality. When the direction of transfers is upward, from younger to older ages, as for public pensions and health care for the elderly, then incremental births reduce the old age dependency ratio, and there is a positive externality. When these three major transfer programs and other smaller ones are summed, the net direction of transfers can be found. In the US, the net direction is strongly upward, from younger to older. These results would be even stronger for other OECD countries, since their populations are typically older and their pensions more generous than in the US. In the Third World countries evaluated other than Brazil, the net direction of transfers is downward. Brazil, like a number of other Latin American countries, has a strong pension program, unlike most countries in Asia and Africa. It is also likely that the net direction of public transfers throughout the Third World is strongly downward, except for those countries in Latin America with generous unfunded public pension programs.

Now consider public goods. Expenditures on the military are the main item in this category for the US and Saudi Arabia, but for other countries social infrastructure dominates. Public goods and social infrastructure advantages generate positive externalities to childbearing for all countries, falling in the range of 2 to 10 times the level of GNP per capita.

These three broad kinds of externalities can be summed to find the net externality. Ignoring environmental externalities, there is a substantial positive net externality to childbearing in the US, three times as great as per capita GNP. This would probably be approximately true for other OECD countries as well. None of the Third World countries evaluated has a positive externality (although Kenya has 0), while Brazil and Saudi Arabia have very large negative externalities. It is striking that Kenya and Bangladesh, two countries that are generally regarded as having serious population problems, both have externalities near 0 relative to GNP per capita. If global environmental externalities were taken into account at the level discussed earlier, then all net externalities would be negative.
The estimates just discussed were based on a simple model and the analysis was done by comparative steady states. In more recent work, Lee and Miller (1997) examined fiscal impact externalities in a more detailed and nuanced manner. They projected tax payments over a very long horizon according to whether or not there was an additional birth in the base year, including the impacts of all descendants of the incremental birth as well. They found a positive net externality of $170,000, which is 6 times per capita GNP for the reference year (which compares to 3.6 in Lee and Miller, 1997, adjusted for non-fiscal effects). Given the increase in the cost of health care benefits and differences in some key assumptions, the numbers are in reasonable agreement.

4. Broader Views
The evaluations just reported are based on the narrow concept of technical externalities, following the main development of the theoretical literature. Some analysts argue for a broader view of externalities, even though the welfare implications are then no longer clear. Some stress pecuniary externalities: an additional birth will mean less land and less capital for future workers, and therefore lower productivity and wages. Nerlove et al (1986) analyzes this case, and shows that under certain assumptions there is no technical externality, and collective fertility decisions would not improve welfare. Nerlove et al views parents as deriving utility from their own consumption, the number of children they have, and the future utility or consumption for their children. But it is possible that the goals of Society differ from those of the individual parents. In particular, Society may give the welfare of future generations greater weight than do the individual parents, or value wilderness or other aspects of the environment more highly. Society may care more about the distribution of income, or give a different weight to the welfare of women or pre-existing children than does the household decision-maker. In these cases, there is no reason to expect that the sum of individual decisions will be socially desirable, and there will be many other reasons besides technical externalities to expect a gap between the individually and socially optimal level of fertility.

There may also be a different kind of externality, in which one person’s fertility may influence decisions by others. For example, if one couple uses contraceptives to control fertility, that may convey information to other couples, enabling them to make a better informed decision. Or it may alter the social norms that influence the fertility decisions of others, by weakening the influence of traditional institutions opposing contraceptive use. Or some couples may imitate others. Dasgupta (1993) considers some of these possibilities.

5. Implications for Policy
The difficulty in assessing and quantifying environmental externalities, which are potentially very large for couples in industrial nations, renders all the estimates even more
uncertain. The numbers presented above are too shaky to guide policy decisions. But it is useful to consider what they would entail if taken at face value, setting aside the question of environmental externalities.

Once the direction and magnitude of childbearing externalities have been identified, there is a clear policy implication: governments can in principle improve the welfare of their populations by inducing couples to have more children where externalities are positive, and fewer where they are negative. One means to achieve this would be by “internalizing” the externality, such that through taxes or subsidies, the couple is brought to face the full social cost or benefit of the incremental child when making its fertility decision. For example, in industrial countries, the size of the retirement pension could be linked to each couple’s fertility level; or a couple could receive a bonus of $170,000 on the birth of each child. In Third World countries, each couple might be compelled to make a lump sum payment at the time of the birth of each child. In reality such policies appear to be neither practical nor desirable. They would adversely affect the well-being of children and probably fall disproportionately on the poorer segment of society in Third World countries.

Nor would such policies necessarily be desirable from a theoretical perspective, because the measured externality depends sensitively on the institutional context and on public sector resource allocation. If a country has a positive externality to childbearing due to a large military, the externality could be reduced by reducing the share of military expenditures in the national budget. If a country has a positive externality to childbearing due to a generous unfunded public pension program, the externality could be eliminated by switching to a funded system. If there is a large negative childbearing externality in a Third World country due to public education, note should be taken that fertility is falling rapidly in most parts of the world where it is not already low, and that transfers may soon be flowing upwards across the age distribution. The existence of negative childbearing externalities reflects the ability of individual couples to pass on some of the childrearing costs to society at large. While not unimportant, this is probably not a major reason why fertility is high. More likely high fertility results in part from obstacles faced by couples in obtaining contraceptives, and in part from the absence of institutions which provide superior substitutes for many of the services that children provide, from insurance against sickness, unemployment, or death of spouse, to financial institutions and reliable pension programs. It would most likely be a mistake to attempt to fine-tune policy to these measured externalities, rather than to make more efficient the institutional context within which childbearing decisions are made.
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